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The Glasgow Naturalist

Centenary Edition

Volume 25 Part 2

Journal of
THE GLASGOW NATURAL HISTORY SOCIETY

Glasgow Natural History Society

(formerly The Andersonian Naturalists of Glasgow)

The Glasgow Natural History Society is a registered charity (SCO 12586) with more than 250 members living in Glasgow, the West of Scotland, throughout the UK and overseas. The Society arranges a full programme of events throughout the year in Glasgow and district and occasionally further afield. These are at both specialist and popular level, designed to bring together the amateur and the professional, the expert and the beginner.

The Society has its own library, and provides grants for the study of natural history. Further details about the Society can be found at www.gnhs.org.uk or by contacting the Secretary, The Glasgow Natural History Society, c/o Division of Ecology and Evolutionary Biology, Graham Kerr Building, University of Glasgow, Glasgow, G12 8QQ, Scotland (E-mail: info@gnhs.org.uk). The Society has microscopes and some field equipment that can be used by members. Please contact the Membership Secretary Mr Richard Weddle at the address above for further details.

The Glasgow Naturalist

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The Society has published a number of books on the flora and fauna of the West of Scotland. Full details can be found at www.gnhs.org.uk/publications.html

Front cover

Sampling elvers (*Anguilla anguilla*) on the Ross of Mull. Photograph by Chris Goldspink.

Back Cover

Front plate of *The Glasgow Naturalist* Volume 1 published in 1909. Photograph by Norman Tait.

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The Glasgow Naturalist

Volume 25 Part 2

Contents

EDITORIAL
Darwin in Scotland. Dominic J. McCafferty 1

FULL PAPERS
Recent changes in the distribution of some Scottish butterflies and the arrival of new species in Scotland. Richard Sutcliffe 5

Correspondence (1856-1859) in the archives of the Scottish Association for Marine Science to the Rev. A. N. Somerville and Alexander Somerville on entomological matters. P. G. Moore 13

A note on the occurrence of elvers *Anguilla anguilla* in a stream on the Ross of Mull Scotland over a two year period (2006-2007). Chris Goldspink, Neil Buttery, Clifton Coppolino & Florian Weise 19

A comparison of grey squirrel (*Sciurus carolinensis*) densities between an urban park and semi-rural woodland in Glasgow. Andrew Kyle 23

Did the large copper butterfly formerly occur in Scotland? John Mitchell 27

Otter (*Lutra lutra)* mortality and road bridge design in Loch Lomond and The Trossachs National Park. James D. Hutchison & Dominic J. McCafferty 31

Chrysochromulina associated with fish mortalities in a Scottish freshwater loch. Jan T. Krokowski 43

Two Victorian Botanists: Professor Roger Hennedy and Professor George Francis Scott Elliot. Eric W. Curtis 49

Plant recording at the site of Dixon's Blazes and adjacent area. Peter Macpherson 57

The feathered ranunculus *Polymixis lichenea* (Hübner) Lepidoptera: Noctuidae, in the west of Scotland. Neil Gregory, Glyn Collis & Dawn Collis 59

SHORT NOTES
Sorbus Promiscuousness. R. K. S. Gray 63

First record of the Opilione *Dicranopalpus ramosus* (Simon, 1909) in Glasgow. Mike Rutherford 64

Rapid expansion of a stand of common club-rush at the Balmaha Marshes, Loch Lomond. John Mitchell 64

New records for the red mason bee *Osmia rufa* (Hymenoptera: Apidae) in the west of Scotland. Jeanne Robinson. 65

Plants in relation to ox-bows north of the River Kelvin. P. Macpherson & E. L. S. Lindsay 66

The girdled snail, *Hygromia cinctella* (Gastropoda: Pulmonata: Hygromiidae): first Scottish record. Richard Weddle 67

OBITUARY 69

BOOK REVIEWS 73

PROCEEDINGS 80

The Glasgow Naturalist (2009), Volume 25, Part 2, 1-3

EDITORIAL

Darwin in Scotland

Dominic J. McCafferty

Department of Adult and Continuing Education, University of Glasgow, 11 Eldon Street, Glasgow G3 6NH
E-mail: d.mccafferty@educ.gla.ac.uk

This year we celebrate the bicentennial of Charles Darwin's birth and the 150th anniversary of the publication of *Origin of Species*. In 2009 we are also delighted to mark the centenary of the publication of Volume 1 of *The Glasgow Naturalist* (see illustration on back cover). Darwin has many connections with Scotland and it is due to great naturalists such as Darwin that so many people study the natural world and publish their observations in a journal such as this.

Darwin's connections with Scotland

Darwin's life is an inspiration to naturalists and biologists everywhere and his theory of natural selection is the most important unifying theory in biology today. It is interesting to speculate on how his early student days, his observations of natural history in Scotland and his connections with Scottish scientists influenced his development as a naturalist. At the age of sixteen Charles Darwin and his older brother Erasmus entered the University of Edinburgh to study medicine. Unlike his father he never took to medicine, and "attended on two occasions the operating theatre in the hospital at Edinburgh, and saw two very bad operations, one on a child, but I rushed away before they were completed" (Darwin, 1958). Neither was he impressed by his lectures in geology vowing "never to read a book on geology, or in any way to study the science" (Darwin, 1958). However he enjoyed his chemistry lectures and did take to natural history. During the winter of 1826 he collected marine specimens from the shores of the Firth of Forth, with zoologist Robert Grant. It was Grant who introduced Darwin to ideas on evolution as he was an admirer of his grandfather: Erasmus Darwin and his ideas on transmutation. Although at this time Charles Darwin did not appear to be particularly interested in theories of transmutation (Browne, 1995). He also befriended the oyster fishermen of Newhaven and trawled with them for specimens for dissection. However, "from not having had any regular practice in dissection, and from possessing only a wretched microscope my attempts were very poor" (Darwin, 1958). At this time he also paid for lessons in taxidermy from a John Edmonstone, a skill which he put to good use in later life. While at Edinburgh Darwin was elected a member of a student natural history society, known as the Plinian Society (named after the natural philosophers of Rome) in November 1826. Darwin was an active member attending most meetings and on 27 March 1827 he made a presentation to the Society on two observations of sea-shore animals (Aydon, 2008). His brother Erasmus wrote to Charles Darwin on 9 March 1826 after visiting Glasgow while waiting for a steam boat to Liverpool. He described the exhibits of foreign birds and "dawdled an hour or so over the Hunterian Museum which is well worth going to (Darwin Correspondence Project, 2008). Did he ever take his brother's advice?

How would Darwin's education and achievements at the University of Edinburgh be viewed today? Would he be considered a 'drop out'? Darwin was lucky as he came from a wealthy background and was therefore cushioned from the financial realities faced by many students. We can only guess how useful these early years in Edinburgh were in developing his confidence, mixing with learned Professors and starting to make scientific observations of his own.

Darwin went on to take a B.A at the University of Cambridge and then embarked on his five year voyage on H.M.S. Beagle. By then he had obviously changed his mind on geology as during the voyage Darwin read *Principles of Geology* (1830) by the Scottish born geologist Charles Lyell which was to strongly influence his observations and thoughts on geological formations and species distributions. Lyell was to become a good friend and supporter of his ideas on evolution. Some years later in June 1838 Charles Darwin went on a three week geological field trip to Scotland which he described as his "Scotch expedition". He traveled by steam packet from Liverpool to Glasgow, on to Edinburgh to visit Salisbury Crags, via Loch Leven and then to Glen Roy to study the Parallel Roads: "Here I enjoyed five days of the most beautiful weather, with gorgeous sunsets, and all nature looking as happy, as I felt. I wandered over the mountains in all directions and examined that most extraordinary district. I think without any exception, not even the first volcanic island, the first elevated beach, or the passage of the Cordillera, was so interesting to me, as this week. It is far the most remarkable area I ever examined". (Darwin Correspondence Project 2008). The following year he published '*Observations on the parallel roads of Glen*

Roy, and of other parts of Lochaber in Scotland, with an attempt to prove that they are of marine origin.' in the Philosophical Transactions of the Royal Society (Darwin, 1839). He attributed the parallel lines to the action of the sea and was later to admit his mistake and that they were formed by glacial action.

Darwin attended the British Association meeting at Glasgow on 1st September 1855. "The meeting was a good one and the Duke of Argyll spoke excellently". However in the same letter he adds "the only thing we have done for a long time, was to go to Glasgow; but the fatigue was to me more than it was worth and Emma [his wife] caught a bad cold" (Darwin Correspondence Project, 2008).

Darwin was undoubtedly influenced by a number of scientists associated with Scotland, including his close friend Joseph Hooker, one of the most important nineteenth century botanists who was educated at Glasgow High School and later at the University of Glasgow, where his father was Regius Professor of Botany (Endersby, 2007). Surprisingly William Thomson (Lord Kelvin and Professor of Natural Philosophy at the University of Glasgow) was a critic of Darwin's theory of evolution as Thomson's calculations on the rate of cooling of the earth and the rate of heat output of the sun indicated to him that the earth was younger than the length of geological time that Darwin proposed. Thomson and other physicists of the time were later proved wrong as they were not aware of how radioactivity in the Earth's rocks influenced the rate of cooling (Aydon, 2008).

Darwin's legacy in Scotland

The Glasgow Natural History Society recorded the death of Darwin in 1882: "On the motion of the chairman the Society unanimously agreed to put on record their regret at the death of Dr Charles Darwin, F.R.S., the eminent naturalist" (Proceedings of the Natural History Society of Glasgow, 1884 p 226). Downie (2001) previously pointed out that talks and papers on the theory of evolution and recent advances in genetics have been rarely given to the Society. In 2009 the Glasgow Natural History Society and the University of Glasgow will celebrate the life and work of Darwin with a series of public talks and there will be many other events throughout the UK.

Collections associated with Darwin from Glasgow Museums (Glasgow Museums Resource Centre and the Kelvingrove Art Gallery and Museum) include: a herbarium sheet of the fern - *Adiantum cuneatum* L., collected by Darwin in Cape Verde during the Voyage of the Beagle (1831-36). (Accession number: B.2008.48.1.40002). There are examples of exotic specimens that are named after him including a Darwin's iguana in spirit from Patagonia - *Diplolaemus darwinii* (1920.88.f) and a South American worm lizard in spirit - *Amphisbaeana darwinii* (Z.1997.18.83). There are a couple of specimens of Darwin's stag beetle *Chiasognathus granti,* which only honour him in their common name. Darwin collected this very impressive species in Chile during the Beagle voyage; it must have been irresistible to such a keen coleopterist. Evidently it was not willing to give up without a fight, as he noted "jaws not so strong as to produce pain to finger" (Z.1969.49.[3]). There are also British specimens named after him amongst their holdings, including the woodlouse *Darwinella stevensoni* (1879.69.y, 1902.168.rz) and Darwin's barberry (*Berberis darwinii* ssp. var.) (NHB.1999.21.152, NHB.1999.21.153).

In the The Hunterian Museum, University of Glasgow there is an example of a dried pinned ground beetle *Lissopterus quadrinotatus* Waterhouse, 1843 (Carabidae) (GLAHM 127325) collected by Charles Darwin in the Falkland Islands, March 1834, while on the outward journey of HMS Beagle. This beetle so labelled [possibly in Darwin's handwriting] as to indicate it is one of the original series collected in 1834 and described as a new species in 1843, after Darwin returned from his voyage around the world via the Galapagos. There is also an example of a nest of a Darwin's finch, so far unidentified (GLAHM 126181). The Chile-based financier and mineral collector Frederick Eck, whose collections were donated to the Hunterian Museum in 1884, probably met Darwin during his visit to Valparaiso in 1834. Eck certainly provided Darwin with geological information which he used in his book *Geological Observations on South America, (1846)*, and Darwin's notebooks suggest that there may have been other correspondence (J. Faithfull, Pers. Com.). The University of Glasgow also has an autographed photograph portrait of Charles Darwin.

In recent years Darwin has been appropriately recognised in Scotland. The Darwin Mounds discovered 180 km off the NW coast of Scotland in 1998 were named after the research vessel Charles Darwin. These deep sea sand volcanoes support cold water coral communities that are now internationally protected. Appropriately Darwin was the first to describe the formation of coral reefs in his book *On the structure and distribution of coral reefs* (Darwin, 1842). The University of Edinburgh marked its association with Darwin by naming one of its main biology buildings the Darwin Building and by erecting a plaque at the Royal Museum in 2002 to mark the site of his student lodgings at 11 Lothian Street. Perhaps Glasgow has honoured him too as there are two streets in Scotland with his namesake: Darwin Place, Clydebank and Darwin Road, East Kilbride (www.streetmap.co.uk).

There is no doubt that Darwin left a lasting legacy on the way we think about evolution and biology in the 21st century. A wide range of organisations contribute to our knowledge and understanding of what we now term 'biodiversity'. Although Darwin's ideas on evolution are still not universally accepted, evolution is taught in schools throughout the country and most Scottish universities have strong research teams investigating evolutionary processes. Darwin left us the

ability to understand more fully the natural world. Our responsibility is to ensure that we can continue to enjoy and learn more about life on Earth by conserving it for future generations.

The Glasgow Naturalist Centenary Edition

This year also marks the centenary of publication of the completed Volume 1 of *The Glasgow Naturalist*. The origins of the journal however go back as far as its predecessor the *Proceedings of the Natural History Society of Glasgow* which began sometime after the founding of the Society in 1851 (see Downie & Tait, 2001; Gibson, 2001 for historical details of when the *Proceedings* first appeared). The first volume actually appeared in four separate parts between November 1908 and September 1909 and was edited by D.A. Boyd and J. Paterson (see account by Downie & Tait, 2001). It contained papers, proceedings and excursion notes on a wide range of topics.

In Volume 25 (Part 2) we have two historical papers on contemporaries of Darwin. These include an account of two Victorian botanists: Professors Hennedy and Elliot (like Darwin Hennedy was also born in 1809). A paper on the Somerville correspondence (1856-1859) shows how important correspondence by letter was for naturalists at the time and how useful it is for tracing the history of science and scientific thought (if he were alive today Darwin would now use email and all his correspondence would probably go unrecorded). Darwin would certainly be familiar with the wide scope of papers in the journal today. In this edition there are detailed studies on the distribution and occurrence of plants, insects, fish and mammals. I would like to think that Darwin would have published in *The Glasgow Naturalist* if it had existed in his lifetime.

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I would like to thank all the authors and reviewers for their time and effort which have ensured the high quality science and scholarship of this journal. In particular, I am indebted to Roger Downie and Geoff Hancock who have provided great editorial support and guidance for this edition. I am extremely grateful to June Allardyce for formatting the text, Norman Tait for photographic work and Bob Gray for compiling the Book Reviews. Without their efforts this volume would not have been possible. Thanks to the Scottish Centre for Ecology and the Natural Environment for hosting me during my research leave while compiling this edition.

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FULL PAPERS

Recent changes in the distribution of some Scottish butterflies and the arrival of new species in Scotland

Richard Sutcliffe

Glasgow Museums Resource Centre, 200 Woodhead Road, South Nitshill, Glasgow G53 7NN
E-mail: Richard.Sutcliffe@csglasgow.org

Thirty-five species of butterflies are now resident or regular visitors to Scotland. The distributions of many of them have been changing, often dramatically, in recent years almost certainly as a result of climate change. Climate change may bring opportunities for some species of butterflies, while posing threats to others (Fox *et al,* 2006). Several 'generalist' or 'wider countryside' species, which have a range of food plant or habitat requirements, have been expanding their ranges in Scotland. There have been major expansions in the range of four butterflies and others have shown more gradual increases. Two species have recently been recorded in Scotland for the first time for over a hundred years and another one has been recorded in Scotland for the first time ever.

However, several species which are 'habitat specialists' have experienced declines in their ranges. These have particular requirements relating to habitats and/or foodplants. Site destruction, habitat deterioration, fragmentation of habitats and butterfly populations and climate change are all factors which may be responsible for declines. (Fox *et al.* 2006). Some apparent declines may simply be due to under-recording.

The large number of records submitted to the *Butterflies for the New Millennium* project organised by Butterfly Conservation since 1995 has allowed the changes in butterfly distributions to be carefully recorded.

Orange-tip *Anthocharis cardamines*
In the mid-19th century the orange-tip was a relatively widespread species. However, by the early 1900s it had contracted its range, until there were just two widely separated Scottish populations; one in the Borders and the other in the Grampian - Strathspey area. In the 1950s the species slowly started to spread out from these core areas. Initially this happened slowly, but by the early 1980s the spread gained momentum. A Scottish postcard survey was conducted in 1997 (Sutcliffe & Kirkland, 1998) and was repeated in 2007. Over 800 records received in 1997 and 2,400 records in 2007 from these surveys and other general recording have enabled the rapid expansion to be monitored. The species has now been recorded from the majority of 10km squares in Scotland south of the Great Glen and continues to spread.
As well as the obvious increase in the butterfly's distribution, there has also been a clear change in the species' emergence dates. In the early 1980s the first records were usually at the beginning of May, but it has been emerging progressively earlier. The peak period for sightings has moved forward as well. In 2007 there had been at least 1150 sightings by the end of April. The first report of the species was on 27 March, near Alford, Aberdeenshire (NJ5517).

Peacock *Inachis io*
Except for parts of Argyllshire and Dumfries and Galloway, the peacock was relatively uncommon in most of Scotland until the mid-1990s. In 1995 there was a sudden and dramatic appearance of large numbers of peacocks in southern Scotland. These butterflies bred and established resident populations, from which the species has continued to expand its range. These were possibly migrants from northern England or immigrants from the continent. There were notable influxes of peacocks in 1994 and 1995 reported from Orkney, Fair Isle and Shetland (Pennington, 1996), which were probably of continental origin. There were further records from Orkney and Fair Isle during 2000-2004 (Fox *et al.*, 2006). Stewart *et al.*, (1998) did not believe that the peacock bred regularly in the Highlands, although it turned up regularly as a wanderer. However, in September 2002 observers in Highland noted a sudden appearance of large numbers of them (Fox *et al.*, 2006). Since then considerable numbers have been reported in Highland. The species was recorded for the first time on the Isle of Lewis in 2004 (Randall, 2007). A Scottish postcard and web-based survey organised by Butterfly Conservation in 2008, similar to the orange-tip surveys above, received many hundreds of records. These are still being analysed, but it is clear that the species has now been found throughout Highland, at least as far north as Ullapool and Brora in the west and along the Moray Firth to Aberdeen in the east. It can now be found virtually anywhere on the Scottish mainland.

Speckled wood *Pararge aegeria*
Two different subspecies of the speckled wood have been recorded in Scotland. *Pararge aegeria tircus* (the subspecies which occurs in England) was found in the Borders, Lothians, Fife, Perthshire and Aberdeenshire up until the early 20th century (Thomson, 1980), but is no longer found in these areas.
The subspecies *P. aegeria oblita* is widely distributed in Argyll, Arran and the Highlands; and 19th century records from Wigtownshire, Ayrshire and Lanarkshire were probably of this subspecies. In recent years *P. aegeria oblita* has spread dramatically in the Highlands. The first record from the Inverness area (60 miles from the nearest known colony on the west coast) was in 1955 and Davidson (1956) believed this to be a vagrant from that population. Two individuals were seen together in 1961, 8 miles east of Inverness, suggesting an established population (Barbour, 1986). These early records are probably the origin of the subsequent expansion of the species in this part of Scotland. Barbour (1986) describes possible reasons for the rapid spread of the butterfly between 1969 and 1984, which had reached Banffshire by 1983. Since then, the species has continued to move east and has reached Aberdeenshire. At the same time the isolated populations on the west coast were also expanding, but did not connect to the eastern populations (Stewart *et al.*, 1998).

Further south, the species has recently been recorded near Kenmore in Perth and Kinross, having probably been established by a single nomadic female (presumably from the populations in Grampian) or human introduction (Stamp, 2004). It was reported from Newington in Edinburgh (NT2671) in 2006, and at Monteviot Estate, north of Jedburgh (NT651237) in June 2007 (J.Mercer, pers. comm.). It's presence in Edinburgh was confirmed in June 2008 (Butterfly Conservation Scotland, 2008).

In the north west it has been recorded for the first time from a woodland on Lewis – the first record for the western Isles (Fox *et al.*, 2006). It was recorded from the island of Colonsay (NR396966) for the first time in August 2007 (A. Davis pers. comm.).

In Galloway in 1996 there were two sightings of individual butterflies near Stoneykirk (NX0752) and Torrs Warren (NX1756) and there was a further record in 1997 from Kirkmadrine (NX0848). These were believed to be vagrants from Northern Ireland, where the species is widespread and common (Futter *et al.*, 2006). No others were reported until 2006, when eleven individuals were seen at Senwick Wood, on the west side of Kirkcudbright Bay (NX6545), two at Rascarrel Bay (NX8048), (A. White pers. comm.), five at Torrs Point (NX6746), (M. Pollit, pers. comm.) and another was seen at the RSPB's reserve at Mersehead (NX5866), (G. Smith pers. comm.). Further individuals were seen in the area around Senwick Wood in 2007 and at Rascarrel in 2007 and 2008 (R. Mearns, R. Eagles, J.P. Black and A. White pers. comms.). This indicates that the butterfly successfully survived the winter and poor summer weather of 2007 and will hopefully spread further in Dumfries and Galloway (R. Mearns pers.comm.). Two individuals were seen at Castle Loch, Lochmaben (NY0881) on 6 June 2007 (R. Eagles pers.comm.). These insects in southern Scotland appear to be the subspecies *P. aegeria tircus,* which occurs in Ireland and England. Two fresh individuals with typical *tircus* colouration were recorded at Rascarrel Bay on 17 June 2007 (J.P. Black pers. Comm.)

Ringlet *Aphantopus hyperantus*
The ringlet has also seen a major expansion. In the early 1980s, it was widespread in the north east of Scotland, the Borders, Ayrshire and Dumfries and Galloway, but there were few records of the species from central Scotland or in Highland. When Ringlets were found at Cander Moss near Stonehouse in 1985 they were the first Lanarkshire records since 1911. The species spread quickly and was recorded from sixteen 1km squares in the Clyde Valley in 1991 and 1992 (Futter, 1993).

Since then, the ringlet has moved north towards Glasgow and populations further north have spread south. By 2004 the Ringlet was on the outskirts of Glasgow and in 2005 the first sightings were reported within the city boundary and the butterfly was even reported from Eglington Toll (NS587636). The butterfly also appeared in Renfrewshire at Glen Moss, Kilmacolm (NS3669) in 2005, (N. Gregory pers.comm.) and was seen near Lochranza (NR9350) on the Isle of Arran in July 2006 (B. Zonfrillo, pers. comm.). In 2006, 2007 and 2008 more and more reports were received from in and around Glasgow.

In the Highlands, the ringlet was not regarded as a 'Highland' butterfly there having been only three recent records in the region up to 1996 (Stewart *et al.*, 1998). Within ten years this situation had changed. In 2004 and 2005 there were numerous sightings from the Morayshire coast to Grantown on Spey (Barbour, 2006). By 2006 it had reached Dornoch in Sutherland (McAllister, 2007).

Holly blue *Celastrina argiolus*
The holly blue is widespread in England and there is clear long-term evidence of a northern spread of the species (Fox *et al.*, 2006). Colonies have been present in Cumbria for many years. Apart from two sightings in north and western Scotland (Munlochy in the Black Isle, Ross-shire in 1966 and Knapdale Forest, Argyll in 1972 (Thomson, 1980)), the only Scottish records of the Holly Blue have been in southern Scotland. There have been sporadic records from Dumfriesshire, Kirkcudbrightshire and Wigtownshire over the last 60 years. A female specimen was captured in Dumfries on 26 August 1950 (Cunningham, 1950). It laid 25 ova, from which several specimens were reared. One of these, which emerged on 24 May 1951 is in Glasgow Museums' collection (Registration number Z.1955.33), (Fig. 1a). Another individual was seen in Dumfries in 1973 (Thomson, 1980).

Subsequently there were occasional reports of individual butterflies, from Garlieston (NX44) on 18 May 1990, Rockcliffe (NX85) on 20 August 1992 and Dunskey, Portpatrick (NX0155) on 20 August 2002. A sighting of an unusual blue butterfly at Rascarrel Bay (NX8048) in 2003, may have been a holly blue. In August 2004 there were multiple records from a garden in Rockcliffe (NX8553) and it was also recorded on the butterfly transect at Rockcliffe. In 2005 it was again recorded in Rockcliffe and at two locations in nearby Kippford (NX8354). In 2006 Peter Summers located larvae on ivy at both Kippford and Rockcliffe, confirming that the species was indeed breeding in the area. In 2007 it was also recorded from Dalbeattie (NX8361) (B. Smith, pers. comm.) and the Crichton in Dumfries (NX9874), (M. Pollitt pers.comm.). 2008 saw yet more new locations in the south west. A blue butterfly seen near Stairhaven (NX2152) was probably a holly blue (M. Pollitt pers. comm.). A female was seen on 9 and 10 August in a garden in Ayr (NS3320), (A. Murray pers. comm.). A single individual was seen in the centre of Kirkcudbright (NX6850) on 21 August (N.Gregory pers. comm.) and another was seen in a garden in Kilmacolm, Renfrewshire (NS3670), on 2 September (N.Gregory pers. comm.).

It is not certain if the earlier records of holly blue represent vagrants, and it has recently established itself in the area, or if it has in fact been present in very low numbers in Dumfries and Galloway for a long time. (Futter *et al.*, 2006).

In the east there was a single record of holly blue from Anstruther, Fife recorded by Ann Marie Smout on 18 August 1998. In 2006 a strong colony of the butterfly was discovered at Loanhead on the outskirts of Edinburgh (Bowles & Fox, 2006a). In April and May 2007 the species was also reported from further sites in the New Town and from the Royal Botanic Gardens in Edinburgh (NT2475) (R. Buckland pers. comm.). Others were seen at Newhailes (NT3272) (Butterfly Conservation Scotland, 2007). There were further sightings in the Lothians in 2008 (R. Buckland, pers. comm.).

Marsh fritillary *Euphydryas aurinia*
In Scotland the marsh fritillary is restricted to parts of Argyll, Islay, Jura, Mull and southern Inverness-shire. It is generally regarded as a sedentary species. Marking studies have shown that most adults rarely fly more than 50-100m, but a small proportion disperse further and females have been known to colonise sites 10-15k m away (Asher *et al.*, 2001). It was therefore a surprise when the species turned up at Balnakailly Bay (NS022743) at the northern tip of the Isle of Bute in 2006 (G. Walker, pers. comm.), at least 20km away from the nearest known colonies on the other side of Loch Fyne. In 2007 further butterflies were seen at the same site and numerous larvae were located in April 2008 (P. Kirkland pers. comm.). Another site was discovered at the southern end of the island at Glencallum Bay (NS13527) by members of Edinburgh Natural History Society in 2007 (J. Waddell, pers. comm.). In June 2008 a third Bute site was discovered at Scoulag Moor (NS092605) by N. Mullholland. It seems unlikely that the species has been present but remained undiscovered on the island and then suddenly turned up in three different localities. It is more likely that these represent completely new sites for this species. Marsh fritillaries were also found near Mallaig at another site many miles from the nearest known colony in 2007 (Butterfly Conservation Scotland, 2007).

Pearl-bordered fritillary *Boloria euphrosyne*
The Pearl-bordered Fritillary has undergone a dramatic decline in Britain. Although it is still widespread in the west of Scotland and the Highlands (Asher *et al.*, 2001), several colonies in south west Scotland have been lost since the 1970s. However, possible new records have recently come to light for the Pearl-bordered Fritillary on Arran. The species was apparently recorded at a site on the lower slopes of Goatfell in June 2007, and there are also possible records from nearby Glen Rosa from 1993, 2001 and 2003 (S. Mason, pers. comm.). Although the recorders are adamant about their identifications, there are some doubts about these records and confirmation is still required.

Small blue *Cupido minimus*
The small blue occurs at several sites in Angus, at coastal sites along the Moray Firth and in north east Caithness, and some inland sites in Speyside. It was formerly reported from the Arran, Dumbarton and even Govan up until 1900, and was known from Ayrshire and Galloway until the 1970s. The last records from south west Scotland were from Rockcliffe on the Solway Firth in 1980. It was still present at Coldingham and Burnfoot in Berwickshire up until 1994. It also occurred at two sites on the disused railway line at Hawick until the late 1990s, until the habitat became unsuitable and it died out. It was then believed extinct in southern Scotland, but was re-discovered by Iain Cowe at Catcairn Bushes (NT9659), a coastal site in the Borders on 18 June 2007 (Bowles & Fox, 2007).

Clouded yellow *Colias croceus*
The clouded yellow is an irregular migrant to Scotland from northern Africa and southern Europe. It migrates northwards and although regularly seen in England it was formally a rare butterfly in Scotland. Apart from notable 'clouded yellow years' such as 1992 when there were over 2,300 individual butterflies reported, it was so rare that every record was notable (Sutcliffe, 1994). Since 1994, it has become a much more regular visitor to Scotland and has been reported almost every year. The majority of records tend to be from the Solway and Ayrshire coasts, but there have also been sightings from as far north as Skye, Easter Ross and the Moray Firth. Large numbers were seen in south west Scotland in 1998 (at least 72), 1999 (at least 77), 2000 (at least 565) and 2006 (at least 41).

Dingy skipper *Erynnis tages*
Probably now Scotland's most endangered species, the dingy skipper has two widely separated populations – one in the south west in Dumfries and Galloway and Ayrshire and the other in north east Scotland, mainly along the Moray Firth. It has disappeared from several sites in recent years. Some sites in the Highlands have been lost due to building or they have become overgrown with bracken, trees and rank vegetation (McKellar & Barbour, 2005). However, it seems to be able to survive at very low population levels and go undetected for several years. It was unrecorded at Pinbain Burn (NX1391), a frequently-visited site on the Ayrshire coast between 1997 and 2006, but was rediscovered there in 2007 and was seen again in 2008. (R. Henderson, pers. comm.). Targeted searches located populations at three sites on the Galloway coast in May 2008 (J.P. Black, pers. comm.) and an individual was discovered for the first time at the Scottish Wildlife Trust's Reserve at Feoch Meadows in Ayrshire (NX262821) on 3 July 2008 (G. Smart, pers. comm.).

Green hairstreak *Callophrys rubi*
In Scotland the green hairstreak is a widespread but local species. It is inconspicuous and its small colonies are easily overlooked, making detailed interpretation of change difficult (Fox *et al.*, 2006). However, the species may have suffered a decline in SW Scotland as there were several colonies reported from the region during the late 1990s but there have been very few recorded since then – especially in Dumfries and Galloway. This may be due to under-recording, rather than an actual decline.

Purple hairstreak *Neozephyrus quercus*
The purple hairstreak is an easily overlooked butterfly, as it flies around the tops of oak and ash trees and rarely comes down to ground level. It is found in oak woodlands in central Scotland, Argyll, Ayrshire and Dumfries and Galloway. There are a few sites in Stirling and Perthshire and it was discovered for the first time in Highland in 2003 and 2004 from Morvern (Barbour, 2006). It was recorded from Renfrewshire (at Langbank, NS3773) for the first time in 2005 (J. McOwat, pers. comm.). In Glasgow it was only known from Garscadden Wood (NS5272), but in 2006 it was also confirmed from Bull Wood (NS5162) in south west of Glasgow (R.Sutcliffe, pers. obs.) and another woodland near Gartloch (NS6767) in the north of the city (A. McNeil, pers. comm.). In 2008, the species was discovered for the first time on the Isle of Bute. A single individual was found at Balnakailly Bay (NS0274) (J. Herriot, pers.comm.).

In England there is good evidence of range expansion in Northumberland, County Durham and elsewhere (Fox *et al.*, 2006). In Scotland it is more likely that many new records simply represent under-recording in the past, rather than a real expansion. However, the species does seem to be absent in apparently suitable habitats in some parts of Scotland, such as the Clyde Valley. This may be because the butterfly prefers pedunculate oak, *Quercus robur*. It appears to be absent from many oakwoods, especially those on acid soils and does not seem to have been recorded where sessile oak, *Q. petraea* is dominant (Futter *et al.*, 2006), although its key Loch Lomond sites are considered to be *Q.robor/petraea* hybrids. Further observations are needed to confirm this.

Wall brown *Lasiommata megera*
The wall brown was formerly recorded in the Lothians, Borders, Fife, Clackmannanshire and as far north as Aberdeen but became extinct in the east of Scotland before 1900 (Thomson, 1980). It returned to Berwickshire in 1955, and was recorded at some time between 1970 and 1988 from St Abb's Head (Emmet & Heath, 1989). There were then no records until one was seen at St Abb's Head in 1997 (Stamp, 1998). In 2006 the species was reported from Dunbar, Duns and Galashiels, suggesting it is now starting to re-colonise the Borders (R.Buckland, pers.comm). It was also reported from Catcairn Bushes (NT9659), in 2008 (Butterfly Conservation Scotland, 2008).

In the west the species is widespread in Dumfries and Galloway and southern Ayrshire, where it is commonly associated with coastal sites. It was also recorded at isolated sites on Arran, Bute, Islay, Jura and at Arisaig in the 1970s. There was a sighting on Bute in 1989 (R. Sutcliffe & E.G. Hancock, pers. obs.) and one was seen at Dumbarton in 1990 (Futter *et al.*, 2006). There were no other records from outside its core range until it was discovered at Carsaig on Mull (NM51) in 2004 (B. Prater, pers. comm.).

Large heath *Coenonympha tullia*
Although widespread in South West Scotland and the Highlands, the large heath appears to be declining. This is in part due to the increasing isolation and destruction of its preferred lowland bog habitats (Futter *et al.*, 2006).

Two species have been recently been recorded in Scotland for the first time for over a hundred years and another species has been recorded in Scotland for the first time ever.

Comma *Polygonia c-album*
In the mid 19th century, the comma was resident in Scotland as far north as Fife and Clackmannanshire. However its range had retracted and the last Scottish sightings were 'about 1870' from Berwickshire. By the 1920s it was restricted to south of the English midlands. Since the 1930s the butterfly has moved slowly but steadily north again and had reached Durham by 1976 (Thomson, 1980). After an absence of 130 years the butterfly reappeared in Scotland, in 1996, when it was recorded near Chesters in the Borders on 26 October 1996 by Mr D. Skinner. There were a further four records from the Borders in 1997, four in 1999 and two in 2001. In addition, there were single records from Dumfries & Galloway in 1999, 2000 and 2001. These first records were regarded as vagrants by Asher *et al.*, (2001). However, in 2002 there were at

least 12 sightings in the Borders, Lothians and one from as far north as Midmar, Aberdeenshire (NJ6409). There were at least another seven sightings in 2003, including some from Fife and one from Fenwick, Ayrshire (NS4643). 2004 saw a dramatic increase in records with nearly 50 reports including one from Fort Augustus, Highland (NH3709). In 2005, 2006 and 2007 there were many sightings in the south east.

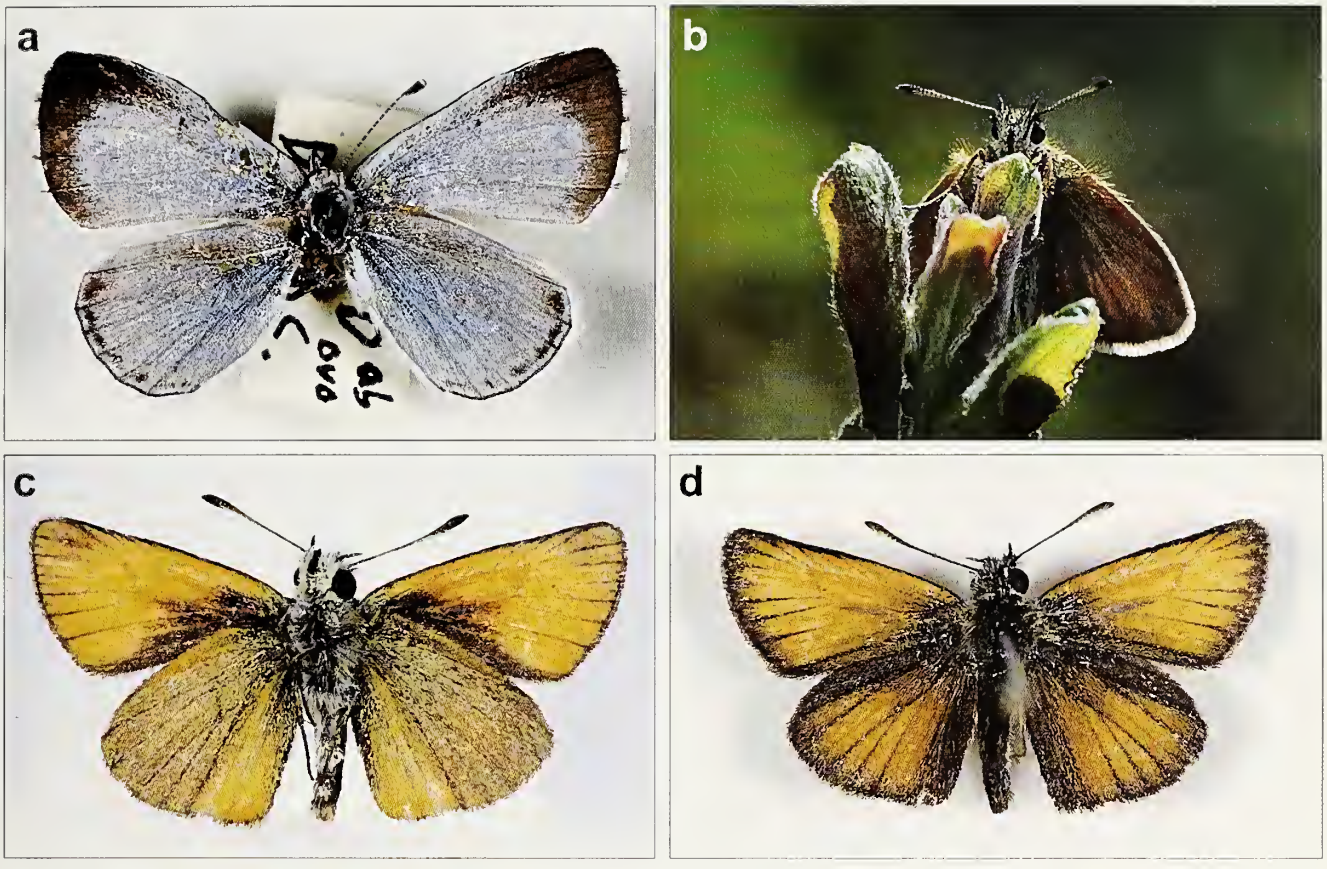

Fig. 1a. Holly blue. Bred from ova, Dumfries 26 August 1950. Emerged 24 May 1951 Glasgow Museums registration number Z.1955.33 Photograph: Culture and Sport Glasgow (Museums). **b.** Essex skipper (male). Birkshaw Forest, Dumfriesshire, August 2007. Photograph: Richard Mearns. **c.** Essex Skipper (male). Underside of antenna. Birkshaw Forest, Dumfriesshire, 20 August 2007 Glasgow Museums registration number Z.2007.54. Photograph: Culture and Sport Glasgow (Museums) **d.** Essex Skipper (male). Birkshaw Forest, Dumfriesshire, 20 August 2007.Glasgow Museums registration number Z.2007.54. Photograph: Culture and Sport Glasgow (Museums)

Breeding was confirmed for the first time in Scotland with the discovery of a larva on Elm near Kelso in the Borders in August 2006 (Bowles & Fox, 2006b).

By the end of 2007 it had been recorded in about seventy 10km squares in Scotland (the majority in the Lothians, the Borders and Dumfries and Galloway). The first record for the Glasgow area was reported in 2007, when the species was recorded from Mugdock Country Park (NS5477), just north of the city (S. McQueen, pers. comm.). Several commas were also recorded from the Motherwell, Hamilton and Lanark areas (Hancock, 2008). This species now appears to be firmly established in southern Scotland (Fig. 2).

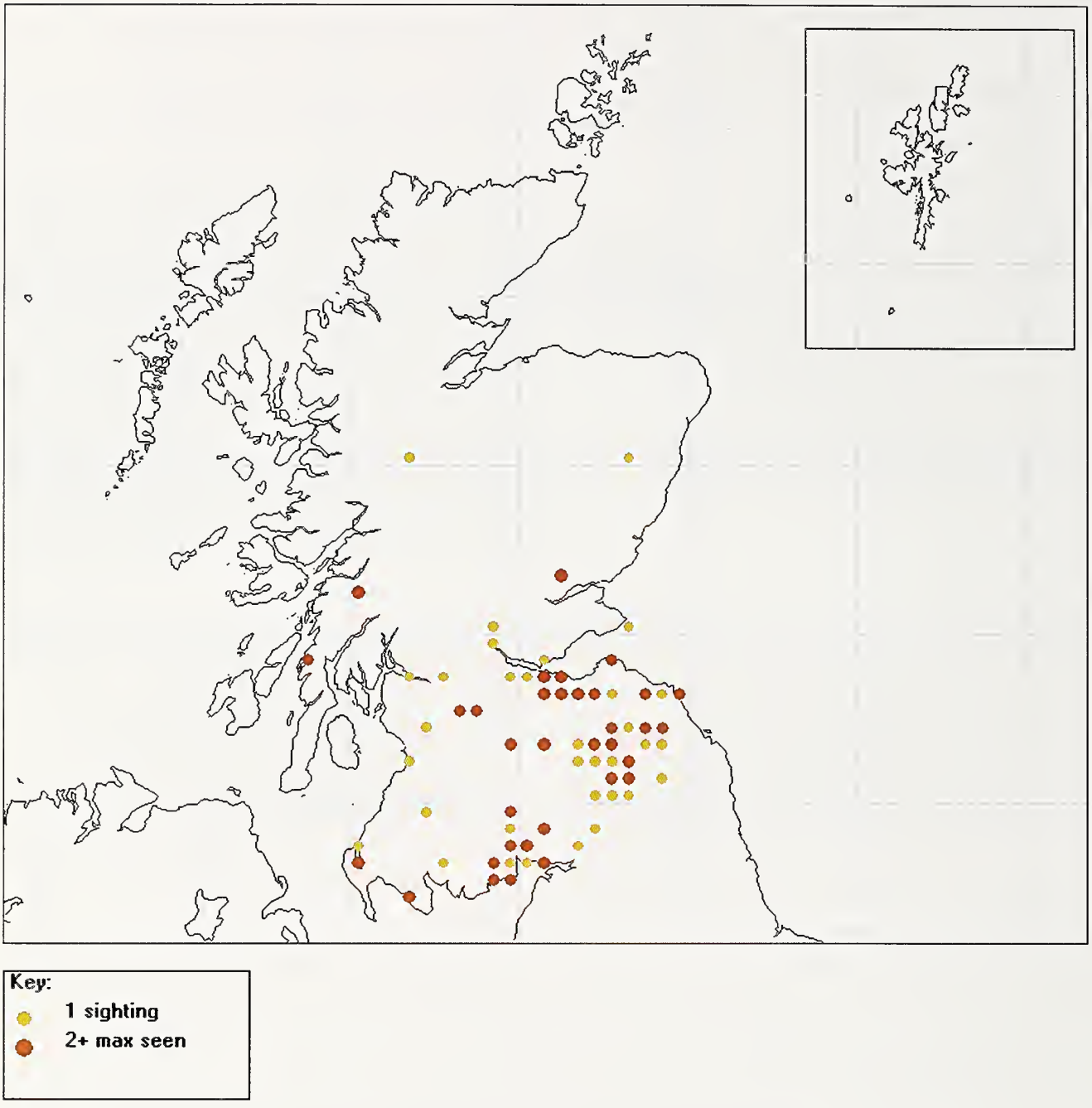

Fig. 2. Distribution map showing records of the Comma reported in Scotland 1996-2007.

Small skipper *Thymelicus sylvestris*
The only historical records for the small skipper in Scotland were from the neighbourhood of Edinburgh in 1811 and Alloa Parish in 1845 (Thomson, 1980).

The species has undergone a rapid expansion in northern England since the 1970s. Between the publication of the Atlas of butterflies in Britain and Ireland, covering the period 1970-1982 (Heath *et al.*, 1984) and the Butterflies for the New Millennium survey (1995-1999), the species extended its range north by nearly 100km (Asher *et al.*, 2001). By 2004 it was within a few miles of the Scottish border (Fox *et al.*, 2006) and widely expected to reach Scotland 'within the next five years'. The prediction was soon justified. Individual Small Skippers were reported from five different sites in 2006.

The first report was of at least five individuals seen at a disused railway line at Hassendean near Lilliesleaf (NT5420) in the Borders, by Derrick Moore on 21 July. (J. Mercer pers. comm.). They had also been recorded at Chirnside (NT859578) in July 2006 by Iain Cowe (but not reported until 2007) and in Newcastleton Forest (NY516901) on 18 July by David Spooner. In Dumfriesshire some were reported from Upper Dormont (NY102763) on 28 July by Owen Figgis; and at Gall Moss near Torthorwald (NY027814) on 3 August by Stuart Graham. Most of these places are many miles from the nearest previous records in northern England. This means that they had either been in the area for some time and overlooked or that the butterfly has expanded into southern Scotland very rapidly. Given the fact that the butterfly suddenly appeared in several different places at once, the latter explanation is most likely. Bizarrely there was also a confirmed record in July 2006 of an individual small skipper seen in a garden in Newtonmore (NM79) in the Highlands. It is highly likely to have been accidentally transported there by human activity.

In 2007 and 2008, the species was again recorded at Birkshaw Forest near Dormont. In the east, one small skipper was reported from the outskirts of Berwick-upon-Tweed (NT9853) on 16 July 2008 (Berwick Wildlife Group, 2008), and two were seen at Piper's Knowe Quarry (NT8859) by Iain Cowe on 4 July 2008, suggesting that the species is consolidating its foothold this far north and should continue spreading (Prater, 2008).

Essex Skipper *Thymelicus lineola*
On 29 July 2007, at the Upper Dormont site where small skippers were reported in 2006, Owen Figgis noticed that the skippers he was seeing did not look like small skippers after all. At about the same time, Richard and Barbara Mearns also noticed that the skippers they were seeing along forestry tracks in the same area did not look like small skippers. Looking at the underside of the antennae, they appeared to be black, rather than orange. This feature distinguishes the small skipper from the Essex skipper. Could these butterflies really be Essex skippers? The nearest known Essex Skipper populations are over 150km away in southern Yorkshire, and although it has shown the greatest percentage increase in its distribution of any resident species of British butterfly since 1970 (Fox *et al.*, 2006), it seems extremely unlikely that it could have reached Scotland of its own accord. One theory is that it may have been introduced accidentally with a load of hay from the south (R.Mearns pers.comm.) Numerous photographs of the butterflies were taken (Fig. 1b) and opinions were sought from several butterfly experts in England.

On 20 August 2007, a single specimen was taken by Dr Jim Black at Birkshaw Forest (NY123778) to settle the debate. The specimen was identified by Glasgow Museum's entomologist, Jeanne Robinson as a male Essex skipper (Fig. 1c, d) and has been added to the museum's collection (registration number Z.2007.54).

Essex skipper has so far only been confirmed as present at Birkshaw Forest. However, skipper butterflies were also seen at two nearby sites near Dormont (NY1175) and near Eskrigg (NY1279), (R. Mearns, pers. comm.). It is quite possible that these butterflies were Essex skipper as well. On 5 August 2008, seven small skippers and one Essex skipper were observed flying together at the same site at Birkshaw Forest (NY122778), (J.P. Black pers. Comm.).
There are now two almost identical species present in southern Scotland, as well as the similarly coloured large skipper *Ochlodes sylvanus* , which occurs in Dumfries and Galloway, southern Ayrshire, and Borders and was recorded for the first time in the Lothians at Linn Dean (NT4659) in 2008 (Davidson, 2008). Great care is now required when identifying any skipper butterflies seen in this part of the country.

Which will be the next new species to appear in Scotland? The white-letter hairstreak *Satyrium w-album* is now found just south of the border in north east England and the gatekeeper, *Pyronia tithonus* occurs in the Lake District. We will have to wait and see.

The author would welcome any records of the above species (or any other Scottish butterflies).

ACKNOWLEDGEMENTS
The author (who is the recorder for South West Scotland Branch, Butterfly Conservation) would like to thank the many individual recorders who have provided butterfly records, including those mentioned above. Special thanks to Richard Fox (National recorder, Butterfly Conservation), Duncan Davidson (recorder, East Scotland Branch, Butterfly Conservation), David Barbour (recorder, Highland Branch, Butterfly Conservation), Richard Buckland, Richard Mearns and Owen Figgis for supplying specific records; Jim Black, for collecting the specimen of Essex skipper; Jeanne Robinson for confirming its identification and Richard Mearns, who provided the photograph of the Essex Skipper in Fig. 1b.

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The Glasgow Naturalist (2009), Volume 25, Part 2, 13-17

Correspondence (1856-1859) in the archives of the Scottish Association for Marine Science to the Rev. A. N. Somerville and Alexander Somerville on entomological matters

P. G. Moore

University Marine Biological Station Millport, Isle of Cumbrae, Scotland KA28 0EG
E-mail: pmoore@millport.gla.ac.uk

ABSTRACT

Attention is drawn to some nineteenth-century correspondence addressed to the Reverend Alexander Neil Somerville and to his eldest son Alexander Somerville housed in the archives of the Scottish Association for Marine Science, at Oban, concerning Lepidoptera. Previously unknown letters from Henry Tibbats Stainton, Edward Buckell and Thomas Chapman are presented in full and interpreted in the light of modern entomological understanding.

INTRODUCTION

Whilst perusing the archives of the Scottish Association for Marine Science (S. A. M. S., Dunstaffnage, Oban) for information on nineteenth century Clyde naturalists I encountered a folder of correspondence relating to the Somervilles, father and son. Seemingly the father, the Reverend Alexander Neil Somerville, DD (1813-1889), was interested enough in entomology in the mid-nineteenth century for his name to be listed in Stainton's *Entomologist's Annual* but little other evidence exists of his entomological leanings. It is also possible that he had himself listed as a proxy for his eldest son Alexander (1842-1907) who may otherwise have been deemed too young to be taken seriously as an entomologist at that time. Although the son's natural history interests were initially entomological, eventually they gravitated towards conchology (he became President of the Conchological Society of Great Britain and Ireland from 1901 to 1902) (Knight, 1908), marine biology (Moore & Gibson, 2007) and botany (mainly latterly) (Hill, 1907). The Somervilles had entomological contact with the great Henry Tibbats Stainton (1822-1892), while the son subsequently had an extensive conchological correspondence with James Thomas Marshall (1842-1922). I am presenting a consideration of that more extensive conchological correspondence elsewhere (Moore, 2009).

BIOGRAPHICAL INFORMATION

The Reverend Alexander Neil Somerville, DD (1813-1889) (Fig. 1) was a prominent Free Church minister. He had charge of the Anderston Free Church in Glasgow (built 1844) for forty years. At the age of sixty-four he resigned his pastorate and was commissioned 'Evangelist at Large' by the Glasgow Evangelistic Association, a role he played for the remaining twelve years of his life (Knight, 1980). The death in Africa of David Livingstone (1813-1873) had a huge impact on Victorian society. The impulse to missionary endeavour in far-flung places was inspired in large measure by his example. Somerville was Secretary of the Glasgow Bible Society and was elected Moderator of the Free Church of Scotland (1886-1887). A prominent and influential Scottish churchman, his missionary zeal took him to Spain, India, Australia and Russia and to minister to the Jews of Eastern Europe (Smith, 1890). Among all this other activity, his entomological interests seem to have been minor; they certainly have not aroused comment hitherto. His 1890 publication, *Precious seed sown in many lands: sermons,* contains a biographical sketch.

According to Glasgow's register of births, his son, Alexander Somerville, B.Sc., F.L.S. (1842-1907) (Fig. 2) was born 15 May 1842 (not 1843 as given by Knight, 1908 or 25 March 1842 as given by Jackson, as 'B. D. J.', 1908) at Barony, Lanark. His home address in his youth was 328 Renfrew St, Glasgow (see below). He did three sessions at Glasgow University's Old College during the period 1857 to 1860, where he took a mixture of Arts (Latin, Greek, Logic) and Science courses (anatomy, physiology, zoology, botany). The 1861 census gave Alexander Somerville's occupation as Merchant's Clerk (then aged 19). After a few years working in Scotland he proceeded to India where he spent fifteen years in the service of Messrs Mackinnon, Mackenzie & Co (a firm involved in the coastal trade in the Bay of Bengal, chartering sailing ships plying between India and Australia). This accounts for his not being mentioned in the 1871 or 1881 Scottish censuses. His health suffered in India and he returned to Scotland, re-enlisting in Glasgow University, then newly (after 1870) re-sited at Gilmorehill, where in due course he was awarded his B.Sc. degree (19 November 1885; aged 42) (Addison, 1898). According to his matriculation slip (based on information kindly supplied by Ms Alma Topen (Archivist, Glasgow University)), he studied mainly medical courses in 1883-1885 (senior anatomy, practical anatomy, physiology, plus English literature). From this same source Somerville's address was then 34 Granby Terrace in Glasgow. His subsequent scientific career

in conchology will be dealt with in detail elsewhere (Moore, 2009).

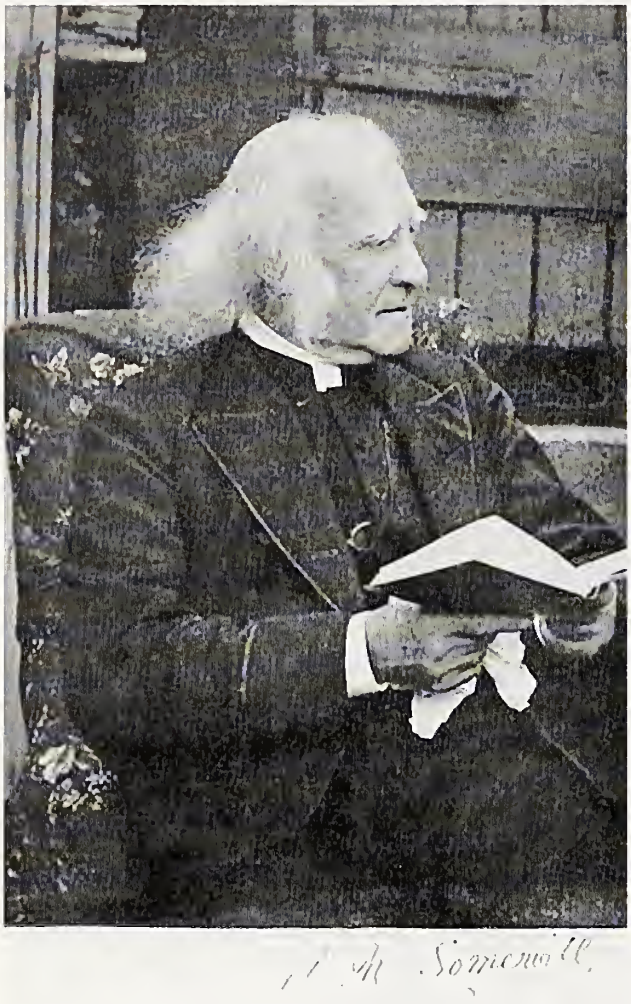

Fig. 1. The Reverend Alexander Neil Somerville, D.D. (date 1880; reproduced with permission from Chris Knight's genealogy pages; http://chrisknight.info/genealogy/showmedia.php?mediaID=145&medialinkID=174).

ENTOMOLOGICAL LETTERS TO THE SOMERVILLES IN THE S.A.M.S. ARCHIVE (OBAN)

The earliest letter in Oban's Somerville archive, dated 20 June 1856, is from H. T. Stainton, that stalwart of the Entomological Society of London (*inter alia*). It is contained within an envelope stamped with a penny red and addressed to "Master Alexander Somerville, Rev. A. N. Somerville, Whiting Bay, Lamlash, Arran, N.B." Alexander would only have been 14 years old then. Clearly, Master Alexander had been sending material to Stainton (doubtless encouraged by his father). It is typical that the guru of entomology was treating this young teenager seriously as a naturalist having access to the up-to-date literature (see Discussion). The manual referred to would have been Stainton's, at the time recently published handbook, entitled *A manual of British butterflies and moths* (Stainton, 1856).

Dear Sir,

Here comes a letter from Mr Stainton! Ain't it jolly? Your blue butterfly is most likely Alexis ♀, has it not on the underside a row of red spots. Alexis has no red spots. See the table of the genus in the Manual.

The Emperor moth is a beautiful species, but the ♀ is to my notions prettier even than the male. Sulphur is a very good way of killing insects. I used to kill all mine with it 10 years ago; it is very simple and very effective. I only injure those which have green colours.

Your insects were nicely squashed by the careful stamping of the Post Office; but I recognise Hipparchia [crossed out and Lasiommata superimposed] Megaera, Rumia crataegata, & Argyrolepia Baumanniana.

Believe me Dear Sir,

Yours very truly

H. T. Stainton

P.S. Do you mean to catch Ligea, I should be very glad of a specimen.

The Common Blue, *Polyommatus icarus* (Rottemburg), was referred to as The Alexis (Rennie, 1832). The Emperor moth, *Saturnia pavonina* (L.), is common on heaths throughout Scotland. Males are predominantly brown whilst the larger females are mainly dove grey, both with eyespots. No one uses sulphur to kill insects nowadays. It produces noxious fumes that turn green shades a dull yellow / brown. *Lasiommata megaera* (L.) is the Wall Brown butterfly, which is much reduced in England now but still occurs sparsely around the coast of southwest Scotland. Pre-1970 it was recorded from the south coast of Arran and may still breed there but there is no recent confirmation. *Rumia crataegata* is now *Opisthograptis luteolata* (L.), the Brimstone moth, which is very common throughout lowland Scotland. Although the species name '*Baumanniana*' has been used to refer to *Aethes hartmanniana* (Clerck), as has the genus name '*Argyrolepia*', it has also been used for *Aethes piercei* Obraztsov. The latter seems much more likely. It is thinly but widely distributed on species-rich grassland and grass / heath throughout Scotland, whereas *A. hartmanniana* has not been reliably recorded here. *Erebia ligea* (L.), the Arran Brown, is hotly disputed. There are specimens reputed to have been taken on Arran and some other loealities in south western Scotland but no properly authenticated records. It is not clear whether the G.P.O.-mangled material of *Lasiommata megaera* referred to was initially misidentified by Stainton as the rather similar-looking satyrid *Hipparchia [semele]*, the Grayling, or whether he had deleted *Hipparchia* as being superseded as a generic name for *L. megaera*.

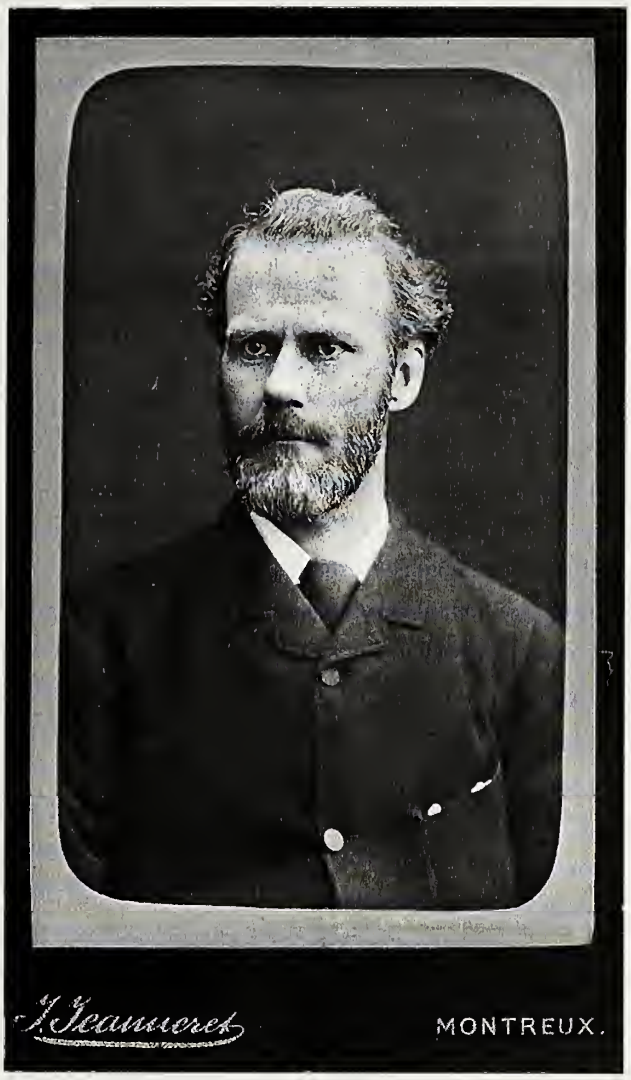

Fig. 2. Alexander Somerville, B.Sc., F.L.S. "carte de visite"-style photograph (reproduced with permission of The Linnean Society of London).

The other communication from Stainton, again retained in its original envelope, was addressed to "Mr Alexander Somerville, Rev. A. N. Somerville, Whiting Bay, Lamlash, Arran, N.B." with the Arran address on the envelope subsequently scored through and "Glasgow" written boldly adjacent. Obviously, the Somervilles had flitted from Arran. But, as clearly, the father was sufficiently well known that "Glasgow" alone would suffice to find him (as, patently, it must have done). All things considered, the Whiting Bay, Arran, address of the correspondence below must have been a holiday home (its date falling within the period of his Glasgow ministry).

This communication is a printed circular (with various enclosures) addressed from "Mountfield, Lewisham October 23rd, 1856" requesting that The Rev. A. N. Somerville confirm his address for the Supplemental List of British Entomologists for Stainton's *Entomologists's Annual* of 1857 as being Whiting Bay, Lamlash, Arran (perhaps his entomology was reserved for holidays). The enclosures are two small folded flyers mainly advertising Stainton's contemporary works then being published by Van Voorst.

Written on a crest-embossed notelet addressed to Mr A. Somerville is a letter also from an amateur entomologist in Ireland

Dublin May 18, 1859

My dear Sir,

My knowledge of the early stages of Minos is I regret to say incomplete – I have had the eggs and young larva by thousands but failed to rear them, they eat Lotus corniculatus [bird's foot trefoil], but I think it cannot be the proper food. I suspect they hibernate and feed up during the early autumn, but never having visited the Irish locality whilst they were feeding I can tell you nothing certainly of the larva or its habits – The cocoon is oval, earth coloured & not unlike that of Eriogaster lanestris only smaller & of a weaker structure. Not attached to the stem of a plant, but in the 3 or 4 cases in which alone I have been able to find it placed out on the surface of the ground, once attached to the underside of a stone. I have spent hours searching for it on a hillside when the moth was emerging daily by the hundred and can only explain my want of success by supposing it is usually subterranean – I shall be very glad to hear the results of your investigations – the moth appears with us during the last week of June. Filipendulae occurs in the same locality, but in very much smaller numbers than Minos – Minos is very fond of the wild thyme. I have seen 20 on a patch not larger than the palm of my hand – Wishing you a pleasant and successful excursion, I am Dear Sir Yours truly

Edward Buckell

'Minos' was previously used as the specific name for *Zygaena purpuralis* (Brünnich), the Transparent Burnet moth. It is hardly surprising the larvae died; they live on thyme (*Thymus drucei*). The moth is found on heavily grazed coastal grassland from Talisker Bay, Skye down to Largieburn, Kintyre. Eggars are so-called perhaps because of their oval cocoons. *Eriogaster lanestris*, the Small Eggar, does indeed have a cocoon that is similar in general shape to that of *Z. purpuralis*. The six-spot burnet, *Zygaena filipendulae* (L.), is a moth that does feed mainly on bird's foot trefoil (*Lotus corniculatus* L.). It is often found together with *Z. purpuralis*, and both are fond of 'nectaring' on thyme flowers.

From the father of a teenage Thomas Algernon Chapman (1842-1921) we have a letter (below) intriguingly directed to an Oban address (another holiday venue perhaps?). Chapman's father was a man who was stated by Salmon (2000: 176) to have been a parent "genuinely devoted to natural history". The Chapmans, father and son, wrote several papers on butterflies under joint authorship. The young Chapman was destined to become an FRS (and correspondent of Darwin) with a specialist interest in Lepidoptera,

31 May 1859
Bathurst Street
Glasgow

Dear Sir,

I am glad to hear that you have commenced your month in the north so auspiciously. The weather has favoured you, and is doubtless still fine with you, for the barometer keeps very steady.

So far as I know, Strenia Clathraria, and P. Globularia are new to Scotland. V. Macularia was taken near Yoker, I think by Mr Scott, but I never heard of its being found anywhere else in Scotland. As the Hebrides are virgin ground to the Lepidopterist, we shall look for some novelties from those hyperborean islands.

Perhaps you may pick up some Hadena exulis (= H. assimilis) of which Dr Standinger brought a great lot from Iceland. He got a number of the pupae out of moss. The only hint I can give you, is to try sugar on a dark cloudy, windy night, if raining it is none the worse should there be favourable trees for the operation.

Algernon and I were two days at Ardentinny, & on our return found several of our best moths had emerged and spoil themselves, particularly two palpina & other large Saturnia from Canada. On the hill we found just one L. Salicaria, did you meet with any on Ben Cruachan. Don't forget to look for the rare Carabi in the western islands. There is a man at Oban, who owes us an account which I fear we shall never get. His name is Mr Wilson, and he keeps or did keep the Argyll Arms hotel there. If you go to Oban, & have time I wish you would learn what you can about him, if he be still in Oban & what he is doing.

I shall be glad to have another report of your progress at your early convenience, and with best wishes in every way,

Believe me
Yours very truly
Thos Chapman
Mr Alex Somerville
Oban

Strenia clathraria is now called *Chiasmia clathrata* (L.), the Latticed Heath moth. It is surprising that this was considered as having been new to Scotland. It is a reasonably widespread species, especially in coastal grassland, in western Scotland and elsewhere. *Procus globularia* must be a mistake. It is the Scarce Forester moth, now *Jordanita globularia* (Hübner) that, in Britain, is only found on chalk grassland in southern England. The similar and easily confused Forester moth, *Adscita statices* (L.), is found locally in wet grassland in southwestern Scotland, including the Oban area, and is most likely the species encountered. *V. macularia* is now called *Pseudopanthera macularia* (L.), the Speckled Yellow moth. It is widely but locally common in western Scotland. *Hadena exulis* (= *H. assimilis*) is now known as *Apamea zeta assimilis* (Doubleday), the Northern Arches moth. This subspecies occurs in highland mainland Scotland. It is predominantly black or dark brown whereas the brown, more hairy form found mainly on Shetland is called the Exile and is *A. z. marmorata* (Zetterstedt) but this form used to be known as '*exulis*'. The Iceland moths will have been the brown form, whereas those expected on the western mainland hills would be black. In the north of the mainland there is something of a cline towards the brown form. 'Palpina' is *Pterostoma palpina* (Clerck), the Pale Prominent. This is a scarce, local but widespread species in Scotland. 'Saturnia' is a term used for relatives of our *S. pavonina*, the Emperor moth, all closely related to 'silk moths'. 'L. Salicaria' is now called *Nebula salicata* (Hubn.), the Striped Twin-spot Carpet moth. It is found widely but locally in highland Scotland. 'Carabi' refers to ground beetles of the family Carabidae.

There are two additional slips in the Oban archives (one dated Wednesday Sept. 8 1858) both from a Miss Wilkinson (of St Andrews, Guernsey) requesting exchanges of insect specimens; one of which is addressed to "A. Somerville Esq, 328 Renfrew Street, Glasgow". No further entomological correspondence resides in the S.A.M.S. Somerville repository.

DISCUSSION

Stainton, a man possessed of an ample fortune, happily remained one who was conscious that "property has its duties as well as its rights" (Salmon, 2000). He particularly welcomed contacts from young collectors (those over 14 anyway) and his home at Mountsfield, now no longer standing, was a renowned gathering place for entomologists (Salmon, 2000: 163). He used to publish (in his highly readable *Entomologist's Weekly Intelligencer*) 'At Home' invitations to young entomologists - whether known to him or not - to inspect his insect collections (Salmon, 2000: 39). Swapping specimens between naturalists to supplement cabinet collections was then greatly in vogue and was pursued with philatelic passion, encouraged by Stainton.

It is evident that Alexander Neil Somerville had encouraged his son in the pursuit of entomology but that his son had decided at some later date to divert his main attention towards conchology (Knight, 1908). I can find no reference to A. N. Somerville ever having published on natural history; his interest may simply have been solely as a conduit to encourage his son's biological leanings, or may perhaps have extended no further than insect collecting as a curiosity.

There are eight specimens listed in the Kelvingrove Museum's registers of Lepidoptera donated by A. Somerville in 1890. These are all different species of *Danais* from various parts of the world (and contain no Scottish specimens). It is not clear whether these all still exist (Richard Sutcliffe, pers. comm.).

ACKNOWLEDGEMENTS

Special thanks go to Dr Anuschka Miller (Scottish Association for Marine Science, Oban) for facilitating my access to their archived correspondence files. Dr

Mark Young (Aberdeen University) and Richard Sutcliffe (Glasgow Museum's research manager) provided, respectively, the lepidopteran and museum collections insights for which I am truly grateful. Ms Lynda Brooks (The Linnean Society of London) is thanked for supplying helpful background information. Ms Alma Topen (Archivist, Glasgow University) provided detailed and timely information on Alexander Somerville's student days. The comments of two anonymous referees were most gratefully received. Mr S. Parker is thanked for processing the figures electronically.

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A note on the occurrence of elvers *Anguilla anguilla* in a stream on the Ross of Mull Scotland over a two year period (2006-2007)

Chris Goldspink, Neil Buttery, Clifton Coppolino & Florian Weise

School of Biology, Chemistry and Health Science. Manchester Metropolitan University, Chester Street, Manchester, M15 GD.
E-mail: C.R.Goldspink@mmu.ac.uk

ABSTRACT

During the course of field work in Scotland between 2006 and 2007 the numbers of elvers within the substrate of a small coastal stream were estimated by sub-sampling using an FBA hand net. The total numbers of elvers caught over a three-day period in 2006 and 2007 were 139 and 396 respectively. These catches were equivalent to population densities of between 266.9 and 740.9 per $100m^2$ of stream bed depending on the method employed to calculate density. Average catch rates varied from 0.15 up to a maximum of 0.5 per sample. Although trivial in size compared to data derived from commercial fisheries there are no data currently available for migratory elvers on the west coast of Scotland. Given the current demise of eels across Europe it is suggested that similar methods could usefully be employed more widely across Scotland to monitor the status of eel stocks.

INTRODUCTION

Until recently, the eel *Anguilla anguilla* was one of the commonest species of freshwater fish found in the UK and north west Europe (de Nie, 1988; Maitland, 2003, 2007; Maitland & Campbell, 1992; Maitland & Adams, 2007, Tesch, 2003). However, since the late 1970s and early 1980s there has been a marked decline both in the yields of 'adult' fish to freshwater fisheries and to those of the more lucrative elver fisheries (Arai *et al.*, 2006; Davies *et al.*, 2004; Dekker, 2003, 2004; Palstra, 2006; ICES, 1998). Losses have been particularly acute (more than 80% decline in annual yields) in Lough Neagh, Northern Ireland since the late 1960s (C. Harrod, personal communication). Although reasons for these trends remain unclear, various monitoring sites have been established on rivers to the south of England to monitor this problem (leading to Action Plans), but as far as we are aware there are no monitoring facilities for elvers or any other life-history stages, currently in place in Scotland (SEPA, J. Godfrey, personal communication). Similarly, given the difficulties of predicting eel numbers by traditional stock and recruitment models there is an urgent need to establish alternative monitoring techniques (Creutzberg, 1961; Gomez-Mourelo, 2005; Ciccotti *et al.*, 1995).

During the course of general survey work on Mull we attempted to estimate the numbers of elvers entering a small stream on the Ross of Mull during the spring 'migratory' period. In this study we present the results of counts made in 2006 and 2007, which seem to confirm the 'recruitment' of elvers to this site.

MATERIALS AND METHODS

The sampled stream (Fig. 1) is situated to the west of the Ross of Mull close to the small 'township' of Fidden (Ordnance Survey NM 31053: 21281). The stream enters the sea via a small estuary (An Caolas) to the west and is bounded on both sides by salt marsh. Some of the connecting streams drain from Loch Poit, which used to be the source of drinking water for Fionnophort. Samples were taken over three days during May 2006 and 2007 at low tide or at the start of the flood tide. Samples were made using a standard Freshwater Biological Association pond net (Fig. 2) worked upstream in the sediments over an area of about 0.5 m^2. Each site was initially marked out with a grid using ranging poles and tape measures.

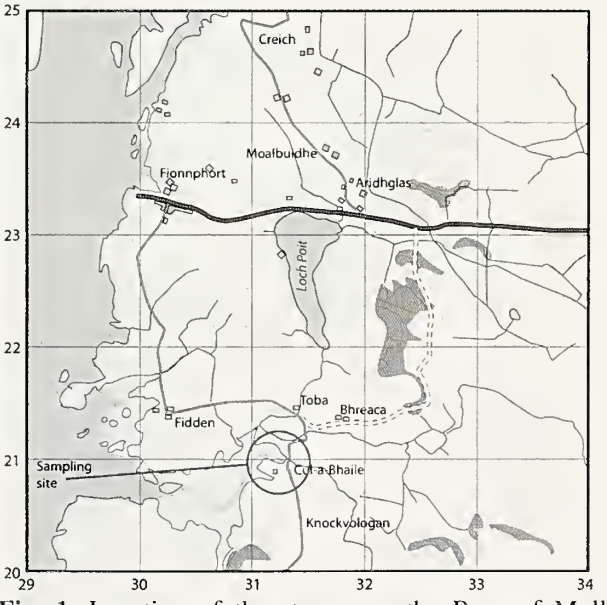

Fig. 1. Location of the stream on the Ross of Mull close to Fidden. Sampling site 1 is to the west of the circle and sample site 4 to the east. Grid lines = 1km
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Fig. 2. Sampling elvers on the Ross of Mull using FBA nets – site 4.

All elvers were removed and measured for length to the nearest 0.5 cm below and allocated to one of three colour classes (transparent, partially pigmented and fully pigmented). Estimates of population density were made first, by multiplying up numbers by area of sub-sample (to $100m^2$) and secondly by methods based on decline in catch per unit effort (CPUE) over three sampling occasions (Seber & LeCren, 1967). During the removal study, all animals were retained in a 100 litre container until the end of sampling period and then returned unharmed to the stream at the end of the study. Unfortunately, only one sample site (number four) could be examined in 2007 because of heavy rains and flash floods. The sampling effort in 2007 (two people) was fixed at three hours. The sediment composition varied from fine silt up to large stones in the upstream section. Site one is estuarine; site four is upstream and largely freshwater.

RESULTS

The total numbers of elvers caught in 2006 and 2007 were 139 and 396 respectively. Individual catch 'rates' varied from 0.1512 per sample up to a maximum of 0.5016 (Table 1). When multiplied up these values were equivalent to population densities of between 151 and 362 per $100m^2$ for the four sample sites in 2006. Data for 2007 are not fully comparable as they refer to only one site, site 4.

Year	Site	CPUE	Number of samples	Population size
2006	1	0.3623	138	362.3
2006	2	0.2609	138	260.9
2006	3	0.1512	172	151.2
2006	4	0.2935	92	293.2
Mean				**266.9**
2007	4 (a)	0.3761	327	109.3
2007	4 (b)	0.3070	342	93.3
2007	4 (c)	0.5016	319	142.2
Total				**344.8**

Table 1. Average values for catch per unit effort (CPUE) of elvers caught during the Spring of 2006 and 2007 by hand net (FBA) together with estimates of population size per $100m^2$ of stream. For 2007 the same site was sampled on three consecutive days (a-c). Site one is downstream and tidal whereas site four is upstream and largely freshwater (see Figs. 1 and 2). All elvers were retained until the end of the sampling period in both years.

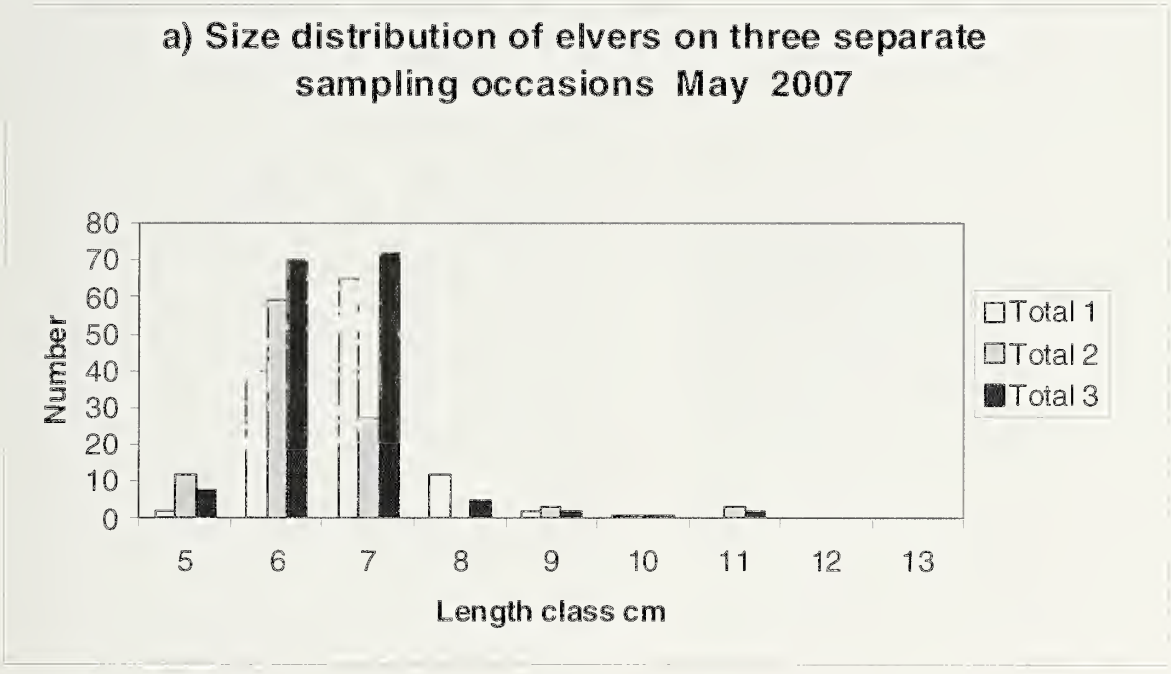
When the four sample sites were re-sampled over three days in 2006, the mean total numbers had declined to values of 157.5 and 119.2 respectively. These values were equivalent to total population estimates of between 651.06 and 740.9 per $100m^2$ (Seber & LeCren and by regression, respectively). If the catches for 2007 are summed (site 4) over three days the total population estimate would be 344.8 elvers per $100m^2$ (see Discussion).

The size of elvers caught in 2006 and 2007 varied from 5cm up to a maximum of 11cm (Figure 3). The average size of elvers caught on day one (mean= 6.80 cm) was slightly higher than that (6.40 and 6.59cm) of elvers caught on the two following days ($F_{2, 394} = 5.31$, $P < 0.01$). Similarly, the average size of fully pigmented elvers (mean = 7.57cm) was larger than that (5.58 and 6.44cm) of the other two colour forms ($F_{2, 346} = 38.89$, $P < 0.001$). Empirical data are not available for the 2006 samples although mean lengths appeared to be higher for each of the four sampling sites (means 7.4, 8.0, 8.0 and 9.65 cm respectively) ($F_{3,134} = 15.95$, $P < 0.001$) than those recorded in 2007. The numbers of animals caught in the three colour 'phases' were 264, 23 and 56 respectively in 2007.

DISCUSSION

As far as we know there are no quantitative data available on the occurrence of elvers in any river or stream in Scotland although some data are available for 'adult' eel stocks in fresh waters (J. Godfrey personal communication). Elsewhere in Europe loss of eels appears to have been particularly severe in the elver catches (EA and CEFAS websites). For instance, values of CPUE for elvers sampled in Den Oever, the Netherlands have fallen from over 120 in the mid 1960s to less than 20 in the late 1990s. In the UK, values of CPUE are difficult to interpret as the unit of effort has increased to compensate for decline in catches.

In England and Wales the number of license applications for dip-nets fell from 2,500 in 1998 to 1,900 in 1999 reflecting reduced catches (E.A.Website). Recently (May 2008), the EA in association with the R.S.P.B. transferred 2000 elvers from the west coast of England to Minsmere on the east coast in an attempt to enhance eel stocks there. There is some evidence to suggest that eels are under-represented in easterly flowing rivers compared to those facing the main Gulf Stream. If successful, this could be a valuable conservation initiative.



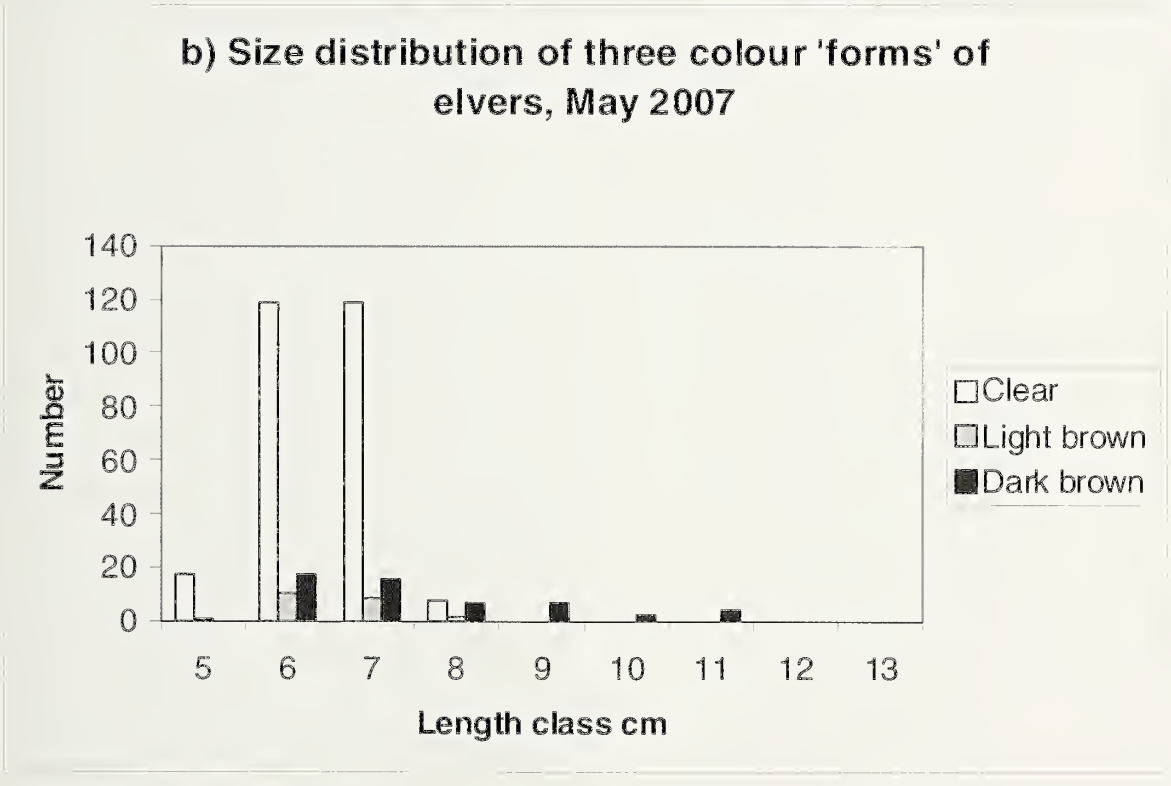


Fig. 3. Variation in the size of elvers caught in 2007 by a) day and by b) colour .

From our own cursory observations, elvers appeared to be widely dispersed across streams on the Ross of Mull in the spring (May) although we have not sampled them all in detail (C.Goldspink, own observations). Presumably, these elvers had moved northwards following the general flow of the Gulf Stream along the coastal regions. Although our sample sizes were trivial compared to catches taken in commercial fisheries, they do demonstrate that elvers are still present in 'significant' numbers in some of the coastal streams on the west coast of Scotland.

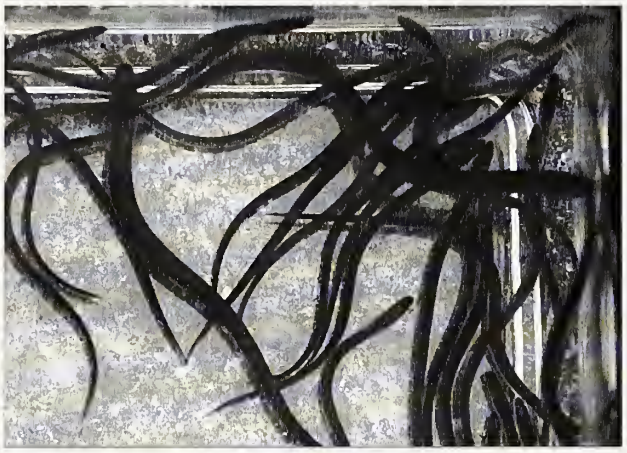


Fig. 4. Sample of elvers from the stream.

Catches remained high in 2007 even after the removal of animals over three days. This suggests that elvers had been stimulated to move upstream as a result of the flash flood then. The ultimate fate of these animals remains unknown but the area is not noted for the abundance of its freshwater invertebrates (C. Goldspink, unpublished). Herons *Ardea cinerea* were regularly seen feeding in the estuary and probably take significant numbers of elvers there. Nevertheless, given the current demise of eels in the UK and in Europe the methods used here could perhaps be more widely applied across the coastal regions of Scotland in other estuaries and streams. It would be an excellent exercise for school children if properly supervised. All elvers were caught within the sediments although some of the larger elvers had penetrated further upstream than the smaller transparent forms, although this observation was not pursued in detail. Some streams on the Ross of Mull are highly polluted with agricultural effluents which is not conducive to a sustainable migration and recruitment of elvers.

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ADDENDUM

The Fisheries Society of the British Isles is to publish a special issue in its journal entitled ***Anguillid Eels*** for publication in June 2009 which further addresses the current demise of the species group. www.fsbi.org.uk

A concise review of the status eels in England and recent management initiatives is available on the Environment Agency (EA) website http:www.environment-agency.gov.uk/subjects/fish

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A comparison of grey squirrel (*Sciurus carolinensis*) densities between an urban park and semi-rural woodland in Glasgow

Andrew Kyle

11A Elm Avenue, Lenzie, Glasgow G66 4HJ
E-mail: fangg8472@hotmail.com

ABSTRACT
This study compared the grey squirrel (*Sciurus carolinensis*) population of a city-centre park with a semi-rural woodland in the City of Glasgow to assess whether grey squirrels were naturally more opportunistic and would therefore exist in higher numbers where human numbers were greater. The study found that grey squirrels were more abundant in the semi-rural woodland where human numbers were lower but there was evidence that the foraging behavior of grey squirrels was influenced by human presence in the city centre park.

INTRODUCTION
There is much debate surrounding the relationship between the grey squirrel (*Sciurus carolinensis*) and the native red squirrel (*Sciurus vulgaris*). The first record of a grey squirrel in Scotland is 1892 (Bryce, *et al.*, 2002) and 1911 in Ireland (Lawton, 2003), introduced from North America. The decline of the red squirrel over the last 70 years is observed to coincide with the expansion of the grey squirrels through mainland Britain (Rushton *et al.*, 1997) - a similar decline and expansion has been observed more recently in Italy (Bruemmer *et al.*, 1999), and yet there is only speculative evidence to suggest that grey squirrels are responsible for the red squirrel decline (The Mammal Society, 2007). In a study by Bryce, *et al.*, (2002) it was shown that the two species even coexist and have done for several years.

Grey squirrels are larger (Kenward *et al.*, 1998), appear to have a more variable diet (Lawton, 2003), are opportunists (Gurnell, 1996) and live in more varied habitats than red squirrels (Bryce *et al.*, 2002). They also possess immunity to, and can be passive carriers of, the parapoxvirus which afflicts red squirrels (Rushton, 2000). For these reasons grey squirrels may be more successful than red squirrels at the present time. Grey squirrels are becoming more and more numerous in urban areas, much like the red fox (Harris, 1986). It is possible that the grey squirrels have also proliferated as they are better adapted for living in urban areas.

The aim of this study was to investigate grey squirrel abundance in two locations of varying human activity. Based on a pilot study two locations in and near the City of Glasgow were chosen. The hypothesis was that the squirrel abundance would be higher in the city centre park as bird feeders and human activity would provide the animals with easy and stable access to food. This was in contrast to the rural park where the animals would use natural sources of food.

METHODS
Fieldwork was undertaken at Kelvingrove Park (NS 572 664) and Garscube Estate (NS 551 703). The two sites were chosen for their location with respect to the city centre. Kelvingrove (34 ha) is near the city centre and is surrounded almost entirely by tenements, apartment blocks and high rise flats. Garscube Estate (37.2 ha) is on the outskirts of the city, and the surrounding buildings are more predominantly bungalows with accompanying gardens. On one side of the estate there is dense woodland. As a result, the two locations are quite different from one another in terms of visitor numbers. For this reason they were selected as the comparable sites in this study - a busy urban park and quiet semi-rural woodland.

Visual counts along transect lines was chosen as the suitable method for this study (Gurnell *et al.*, 2004a). Two transects were selected for each site to provide even coverage of the area and to sample two different habitat types. The total length of the two transects was 1410m and 1350m for Kelvingrove and Garscube, respectively. The transect lines were walked with a set limit of 25m on either side of the line for observation. The total area observed when walking the transect represented approximately 21% of Kelvingrove Park and 18% of Garscube Estate, respectively.

A total of 40 surveys were undertaken between the months of November 2004 and February 2005. Ten surveys were made both during morning and afternoon at both locations. Counts of people were only made on 29 surveys. Transects were not walked in harsh weather conditions, (e.g heavy rainfall, snow) so as to remove weather as a confounding factor. Squirrel behaviour is suppressed somewhat in these unfavourable conditions (Shorten, 1954; personal observations). The morning surveys were undertaken between 9am and 11am, and the afternoon transects between 2pm and 3:30pm.

Squirrels were counted directly from a continual walk along the transect lines, and care was taken not to

count the same squirrel twice. In addition to the squirrel counts a drey count was performed during one of the surveys. Dreys are similar to bird nests but are generally spherical, composed of closely-packed leaves and twigs (Fig. 1). Their location and height in the tree was recorded, using a clinometer (Invicta, IP250, Leicester) as was the total height of the tree and the tree category (see below).

Fig. 1. Squirrel drey in tree, Kelvingrove Park.

The numbers of trees of each type were counted along the transects at both locations. Two types of tree were recorded: deciduous, and evergreen - which included holly (*Ilex acquifolium*) or *Rhodedendron sp.* and coniferous trees. From the observed counts the number of trees per hectare were determined.

RESULTS

Habitat analysis

There was an obvious dominance of deciduous trees in Kelvingrove (second transect) and so this was termed "Deciduous woodland". Similarly the second transect in Garscube showed deciduous dominance. Where the numbers of deciduous were similar to the numbers of evergreen, the habitat was labelled "Mixed woodland" (Table 1).

Human impact

At Kelvingrove 8.3 ± 0.98 people (mean ± SE) were observed in the morning. In the afternoon 9.5 ± 0.97. This compared 2.7 ± 0.49 and 3.4 ± 0.68 people at Garscube in the morning and afternoon, respectively. A two-factor GLM was performed and a significant difference was found between the two sites ($F_{1,116}$ = 52.81, p <0.0001). It is clear that Kelvingrove sees more human visitors at both times of day than Garscube Estate.

Squirrel numbers

The numbers of squirrels observed at both times of day and at both locations were converted to densities using the areas of the transects. In Kelvingrove the mean squirrel density of the area observed was 1.49 ± 0.21 and 1.7 ± 0.24 squirrels/ha in the morning and afternoon, respectively. In Garscube the mean squirrel density of the area was 2.7 ± 0.29 and 1.5 ± 0.25 squirrels/ha in the morning and afternoon, respectively. A three-factor GLM showed that there were significant differences in squirreldensity between locations ($F_{1,72}$ = 5.38, p = 0.023), time of day ($F_{1,72}$ = 5.22, p = 0.025) and habitat type ($F_{1,72}$ = 5.49, p = 0.022), and there was no interaction between these factors ($F_{1,72}$ = 0.33, p = 0.569), (Fig. 2). Overall, Garscube Estate had a significantly higher density of grey squirrels than in Kelvingrove Park with mean densities of 2.7 and 1.7 squirrels/ha, respectively. In Garscube a significantly higher number of squirrels were observed in the morning than the afternoon, and significantly more squirrels were observed in deciduous woodland.

Drey counts

A total of 28 dreys were located (14 in Kelvingrove, 14 in Garscube). This represented 1.99 and 2.22 dreys/ha in Kelvingrove and Garscube, respectively. For Kelvingrove, the mean height of trees supporting dreys was 8.16 ± 0.77 and 9.75m ± 1.27 in Garscube. There was no significant difference in height of dreys above the ground (two-sample t-test = 1.07, p = 0.295) with a mean height of 4.86 ± 0.39 and 5.47 ± 0.45 m, respectively. Dreys were located at similar positions within trees at 63 ± 4.6 and 64 ± 5.9% from the base of the tree in Kelvingrove and Garscube, respectively. Squirrels did not appear to have any preference for deciduous or evergreen trees for drey construction with 46% and 54% found in deciduous and evergreen trees, respectively.

DISCUSSION

Human impact

Approximately three times more people were observed using Kelvingrove Park compared to those recorded at Garscube. Kelvingrove Park is a centrally located urban park surrounded by housing. It is an area of green trees, grass, wildlife and open spaces in a busy industrial city. Garscube Estate is far more rural, attracting mainly dog-walkers and joggers. The surrounding houses each have their own gardens. The trees are more abundant and the paths less managed than the city park, adding to the rustic attraction of the site.

Squirrel numbers

There are several indirect methods for determining squirrel numbers but where individuals are not counted directly estimates are uncertain. Numbers are either over- or under-estimated (Don, 1985). The difference in squirrel numbers between the two habitat types in Garscube indicates that grey aquirrels have a preference for deciduous trees. Grey squirrels prefer broadleaved woodland (Kenward *et al.*, 1998; Rushton, *et al.*, 2000), although various studies have made differing conclusions (Bryce *et al.*, 2001). Rushton *et al.*, (1997) suggest "grey squirrels prefer broadleaved, but may occur in conifers, depending on the availability of broadleaved woodland nearby". It would have been advantageous to compare squirrel numbers in well defined habitat types, but the nature of Kelvingrove and Garscube did not allow this.

Location		Length of transect (m)	No. of deciduous trees	No. of evergreen trees	Habitat type
Kelvingrove	Transect 1	420	106	107	Mixed woodland
Kelvingrove	Transect 2	990	97	76	Deciduous
Garscube	Transect 1	530	201	178	Mixed woodland
Garscube	Transect 2	820	58	27	Deciduous

Table 1. Length of transect (m) and tree counts at each site used to determine woodland type.

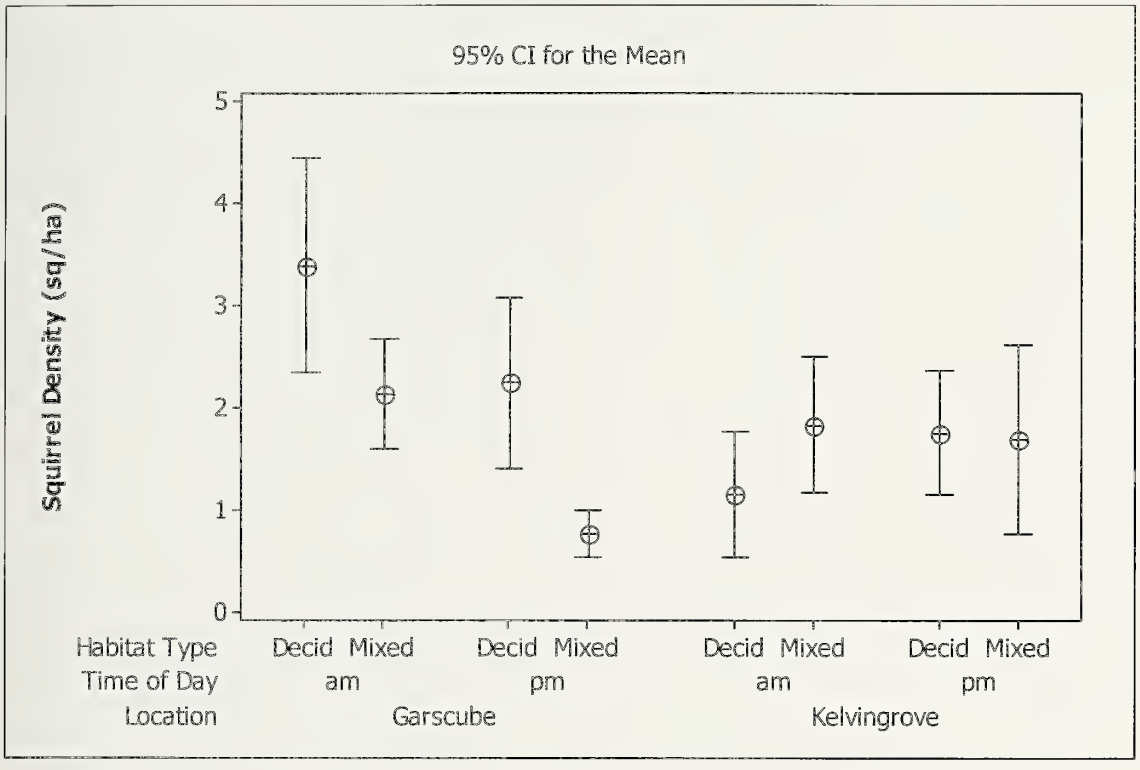

Fig. 2. Interval plot comparison of squirrel densities between sites, times of day and habitat types.

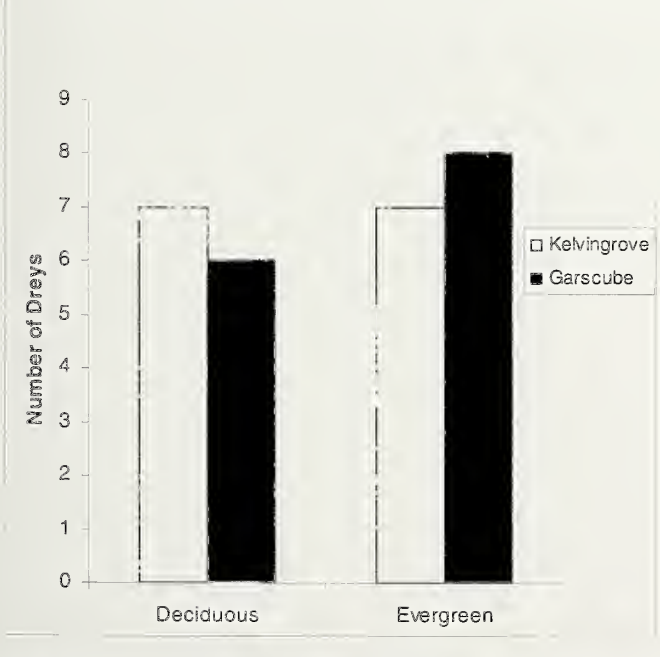

Fig. 3. Frequency of dreys in the different tree types at Kelvingrove Park and Garscube Estate.

It would appear that the Garscube squirrel population is not divided between habitat types and occurs readily in both, although, population estimates are dependant on time of day. In the afternoon there were fewer in the mixed woodland than in the deciduous woodland, although in the morning the numbers were relatively similar.

Overall in Garscube more squirrels were observed in the morning than in the afternoon, although in Kelvingrove the density is similar at both times of day. This may be reflective of increased human activity in the afternoon at Garscube.

Shorten (1954) suggested that squirrels are attracted to quieter areas when foraging. This is supported by this study as there was a significantly higher density of squirrels in Garscube compared to Kelvingrove Park. However, it was observed that the behaviour of the squirrels differed in the two locations. In Kelvingrove Park squirrels were seen to approach humans and took food from their hands, whereas in Garscube Estate their behaviour was the complete opposite. They actively moved away from humans and took refuge in high branches until they could continue foraging undisturbed (personal observation).

Drey counts are another frequently used method for estimating squirrel abundance (Gurnell, et al, 2004), although Shorten, (1954) considers that "drey counts would be a misleading index of squirrel abundance". It is unsurprising that the total number of dreys observed in this study does not differ between the two sites as visual counts were reasonably similar.

No significant difference was found between the height of the trees chosen in Kelvingrove and Garscube. The proportional height of the drey in the tree was deemed a more useful variable to analyse, as it took tree-height away as a confounding factor. There was no preference for height, and it is more likely that deciding factors for drey-construction include availability of materials and tree structure itself as dreys require a sturdy fork in a branch for stability.

ACKNOWLEDGEMENTS

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Did the large copper butterfly formerly occur in Scotland?

John Mitchell

22 Muirpark Way, Drymen, Glasgow G63 0DX

ABSTRACT

The former distribution of the now extinct British subspecies of the large copper butterfly *Lycaena dispar dispar* has been the subject of debate for many years. Evidence for accepting or rejecting two old published records of the large copper in Scotland is re-examined; the conclusion reached is that with the passage of time it is no longer possible to prove or disprove the case for the butterfly having formerly occurred north of the border. A colour illustration of reputed Scottish specimens of the large copper is given.

INTRODUCTION

A species which was lost to Britain mainly through the drainage of its low-lying marshy habitat, the large copper *Lycaena dispar dispar* (Haw.) is undoubtedly the most celebrated of our vanished butterflies. Although it is something like a century and a half since the last individuals of this endemic race of large coppers disappeared – almost certainly into the nets of collectors anxious to obtain specimens for the cabinet before it was too late - the butterfly's historical distribution in Britain is still a controversial subject.

The large copper butterfly in Britain

James W. Tutt (1905), in an assessment of the British case-histories of the large copper butterfly available to him, came to the conclusion that the species had been reliably recorded only from the fen country of East Anglia, at the time a view probably shared by most other lepidopterists. In recent years however, sufficient evidence has come to light to be able to accept with reasonable certainty that at least one other population existed, notably on the Somerset Levels in the south-west (Sutton, 1993). That the early entomological literature contained references to the large copper as a Scottish species was described as 'an impossibility' by Tutt and the records set aside.

This remained the position until George Thomson undertook a comprehensive review of the older butterfly records relating to Scotland, when the large copper as possibly native to the country was once more brought to the fore. Thomson's inclusion of the large copper in his *Butterflies of Scotland* (1980) rests on two entries which appeared in the literature in 1798 and 1819 respectively. The first of these was the publication of volume seven of Edward Donovan's *Natural History of British Insects* (1798). Executed from living specimens according to the title page, colour plate CCXVII (Fig. 1) is that of a butterfly he names as the 'Great Copper'. The accompanying text states ".....We have heard that this insect has been lately found in Cambridgeshire; our specimens were met with in Scotland". George Samouelle in his *Entomologist's Useful Compendium* (1819) may or may not have been alluding to Donovan's account when he listed the large copper as having been recorded from Scotland, but went one step further by adding 'observed near Aberdeen'.

From what is known today of the species' ecological requirements (Pullin *et al.*, 1995), there would appear to be little to have prevented the large copper thriving in at least the eastern counties of Scotland, which are drier and sunnier than those in the west. The lower temperatures experienced in Scotland's northerly latitudes need not have been an effective barrier, for in continental Europe the range of *Lycaena dispar* extends still further north into Finland (Mikkola, 1991). In the butterfly's former haunts in south-east England, the caterpillars of the native large copper fed exclusively on the great water dock *Rumex hydrolapathum*. However, in continental Europe another tall water dock *R. aquaticus* is also recorded as a larval food plant (Higgins & Riley, 1980). Both of these dockens occur but are extremely local in Scotland (Preston & Croft, 1997), although they may well have been more widespread in the lowlands before the draining of the 'wastes' for agriculture began in earnest. Nectar plants frequented by the adult insect - such as purple-loosestrife *Lythrum salicaria*, valarian *Valeriana officinalis*, marsh thistle *Cirsium palustre*, etc. – are all common in suitable places throughout most of Scotland.

To emphasise the fact that anomalies in the distribution of British butterflies do occur, it is worth drawing attention to the chequered skipper *Carterocephalus palaemon*, which for almost 150 years was believed to be confined to the southern counties of England. Then, to the astonishment of all lepidopterists, the skipper was found flourishing in the north-west Highlands of Scotland (Ford, 1945). This example clearly illustrates that it is possible for populations of the same species to exist in differing climatic zones and habitats, separated from each other by by hundreds of kilometres.

How an error could have been made over the first Scottish record

If we accept for the moment that Edward Donovan's record of Scottish large coppers was based on erroneous information as was later claimed, the accurate representation of the butterfly in the published plate shows that the mistake was not one of identification, but through an unfortunate mix-up over where the specimens were obtained. No explanation has ever been forthcoming for how such an error could have been made, so that one possibility involving both a Scottish and an East Anglian connection is offered here.

Although not the first lepidopterists to set eyes on the large copper in Britain, Fenwick Skrimshire (1775-1855) and his elder brother William played a significant role in the butterfly's discovery. Sometime in the 1790s the two brothers came across this (still not authoritatively described) species near Ely in Cambridgeshire, going on to further record it in Norfolk (Tutt, 1905). Fenwick Skrimshire lived most of his life in or around the fenlands of East Anglia, but as a young man he was to spend several years studying medicine at Edinburgh University, qualifying as a physician in 1798. During Fenwick's time in Scotland, his extracurricular pursuits included the collecting and sending of natural history specimens to William and others in England (Crompton & Nelson, 2000). For instance, he is acknowledged by the author of *Lepidoptera Britannica* (Haworth, 1803) for having communicated examples of the newly described 'Brown White Spot' butterfly (since renamed the northern brown argus *Aricia artaxerxes*), then known only from Arthur's Seat and the Pentland Hills. While in Scotland he was further recognised by being elected President of the Natural History Society of Edinburgh in December 1796 (Anon, 1803).

Fenwick's prominence as a naturalist during his Edinburgh days may well have given the impression to some that the Skrimshire brothers were Scottish entomologists. Couple this to the part they played in the discovery of the large copper butterfly in Britain and the opportunity was there for a misunderstanding to have taken place.

CONCLUSION

Did the large copper formerly occur in Scotland? The truth is that the ecological case put forward by the present author - which shows there were no obvious constraints on the butterfly having once been a part of the Scottish fauna - is as speculative as the time-worn opinions which led to its outright rejection by the entomological establishment of the day. Had either argument been examined under the Scottish legal system, the courts would have almost certainly returned a verdict of 'not proven', and after this length of time it seems unlikely that any further information will be forthcoming to settle the matter one way or the other. But in raising the large copper's profile once more, at least today's butterfly enthusiasts now have the opportunity of admiring Edward Donovan's fine colour illustration of the 'Great Copper' which deserves to be better known.

ACKNOWLEDGEMENTS

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Fig. 1. The Great Copper butterfly from Edward Donovan's *Natural History of British Insects* Vol.VII (1798).

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Otter (*Lutra lutra*) mortality and road bridge design in Loch Lomond and The Trossachs National Park

James D. Hutchison[1] and Dominic J. McCafferty[2]

[1]Department of Animal and Plant Sciences, Alfred Denny Building, University of Sheffield, Western Bank, Sheffield, S10 2TN E-mail: j.hutchison@shef.ac.uk
[2]Department of Adult and Continuing Education, University of Glasgow, 11 Eldon Street, Glasgow, G3 6NH. E-mail: d.mccafferty@educ.gla.ac.uk

ABSTRACT

Whilst otter (*Lutra lutra*) numbers are recovering across the UK, otters still face many avoidable risks, predominantly from road traffic accidents. A stretch of the A82, lying within the boundaries of Loch Lomond and The Trossachs National Park, was surveyed to assess both the usage of bridges across water courses, and the suitability of these bridges in providing safe passage for otters. This information was compared with existing otter road mortality data. A relationship between the sites where otter signs were found and the suitability of bridges as safe passages for otters was revealed. Otter mortalities occurred most frequently at or within 50 metres of the nearest water body. Whilst remediation would serve a valuable function in reducing otter road mortalities, it is unlikely to be able to prevent all fatal incidents from occurring. Designs of all new roads and bridges in the National Park should however include elements to allow for the unhindered and safe passage of otters and other wildlife.

INTRODUCTION

The Eurasian otter (*Lutra lutra)* population is currently recovering after a major decline during the latter half of the 20th Century (Chanin, 2006). The decline occurred when hunting and trapping of otters was common, however it is thought that the introduction of organochlorine groups of insecticides played a more major role in otter decline through the contamination of food webs (Chanin & Jefferies, 1978). Now in the early 21st century with a ban on hunting, a reduction in use of pesticides (Philcox *et al.*, 1999), and improvements in water quality and fish stocks, otter populations in the UK are no longer limited and are now recovering (Strachan, 2007). Otters still face many lesser threats which hinder their full recovery (Chanin, 2006). These potential threats include pollution, habitat destruction and disturbance as well as accidental deaths through road traffic accidents (RTAs) and fishing (Anon., 1992).

Road deaths are the primary cause of non-natural otter mortality (Green, 1991; Chanin, 2006). Road networks are expanding, motor vehicles are faster and roads are busier than they have been historically. With these trends continuing otter mortality increases (Chanin, 2006). Within the road network, trunk roads are disproportionably responsible for otter road mortalities. In the UK, these roads account for 57% of otter RTAs whilst only covering 13% of the road network (Philcox *et al.*, 1999). In Scotland, trunk roads make up a smaller proportion of the road network than in the whole of the UK or England. However, since the early 1980s these roads have accounted for around 75% of reported otter deaths (Green, 2008). Motorways account for few deaths despite the speed of the traffic, possibly due both to the failure to report accidents as motorists are unable to stop, and also the potentially increased rate at which corpses are destroyed.

Otters are particularly vulnerable to road accidents when roads run close to water bodies with 67% of all otter road mortalities occurring within 100m of fresh or coastal waterbodies (Philcox *et al.*, 1999). During periods of high rainfall and floods otters may be forced to cross roads which they wouldn't normally have to do, due to their normal routes being obstructed (Chanin, 2006). This is true of roads running parallel to rivers and not just of those roads which cross rivers (Philcox *et al.*, 1999). There is a male bias in the number of otters killed on roads. This could be linked to their larger home ranges and possibly to their bolder behaviour compared with that of females (Philcox *et al.*, 1999). It is also worth noting that otters are regularly observed to cross roads even if there is a safer alternative route (Chanin, 2006). Previous research in marine areas of Loch Lomond and The Trossachs National Park has shown that there are fewer signs of otters near 'A' roads compared with 'B' roads or areas with no roads (McMahon & McCafferty, 2006).

The Loch Lomond and The Trossachs National Park (LL&TNP) was formed as Scotland's first national park in 2002. As such it is important to monitor the human impacts on habitats and species within the park (McCafferty 2004). As river dwelling otters live at low densities and are predominantly nocturnal, unobtrusive and trap-shy, it is hard to study their habitat use and behaviour (Durbin, 1993). The A82 which runs up the

west coast of Loch Lomond is expected to have an impact on the local otter population (McCafferty, 2005a). The aim of this study was to determine the current distribution of otters along the A82 and to assess the suitability of the current road for allowing safe otter movement.

METHODS

Bridge suitability and usage by otters

Eighteen sampling sites were chosen where watercourses passed under the A82. Not all the watercourses along the A82 were covered in the survey due to restriction in the survey time available. The sites were spread along the length of the A82 from the south end of Loch Lomond to Crianlarich (Fig. 1). The sites were selected to cover a variety of different sized water courses which were practical to sample. The maximum width of the watercourses ranged from just less than a metre to just over 30 metres. Each site was visited fortnightly for 10 weeks from the 2nd of May until the 11th of July 2007. On the first visit any otter signs (spraints or footprints) were removed but not recorded as the timescale for their deposition was unclear. For the remaining five visits all information was recorded.

The sampling method used was similar to that of McMahon & McCafferty (2006). Otter spraints and tracks were looked for in 100 metre sampling areas. Ideally these included the 25 metres above and below the bridges on each bank. However due to differing morphology of the sites this was not always possible and if one part of the search area was not practical to sample, the distance was added on to another part of the search area at the site. Any spraints found were collected and tracks were recorded and then rubbed away to avoid repeat measurements on future trips.

At each of the sampling sites the bridge on which the A82 crossed the watercourse was examined. Characteristics which were thought to relate to suitability for otters were measured. These measurements were maximum river width, minimum bank width and maximum river depth (m). Any obstructions which were thought to contribute to bridge suitability were noted for individual cases. Bridges were then categorised into three groups; those with obstructions and no permanent bank, those without obstructions and no permanent bank, and finally those with a permanent bank. Bank state was characterised using the high water line. Using Minitab (version 15.1), bridge characteristics (Table 1) which had been recorded were tested against the presence or absence of otters using a Mann Whitney two sample test. Secondly bridges with and without obstructions were tested against other bridge characteristics also using a Mann Whitney two sample test.

Mortalities

Information on otter road mortalities was received and collated from records held by the LL&TNP Otter Monitoring Group and from data held by Rosemary Green. This included 62 otter mortality records Identified individuals consisted of 19 males, 25 females, of which 33 adults were recorded and 18 juveniles. This information was used to plot a map of deaths in LL&TNP area (Fig. 2). The data set contained information on year, month, age, sex and location of the mortalities. However not all mortalities recorded had a complete set of information. The sample size and categories for each characteristic is shown in Table 2. The distance to the nearest water body for each mortality way measured using 1:50,000 Ordnance Survey maps.

Changes in the number of mortalities recorded over five year periods starting from 1982 were examined using a one sample Chi squared test. Seasonal variation (seasons as defined in Table 2) and difference in mortality between sexes were also tested using a one sample Chi squared test. The ratio of adults to juveniles killed was determined to see if it varied between sexes using a two sample Chi squared test. Mortality records were then split into two categories; those found within 100 metres from a water body, and those found further away. A 100 metre zone was chosen as it has previously been shown to account for most casualties (Philcox *et al.*, 1999). This was then examined using a one sample Chi squared test with an expected 1:1 distribution of mortalities on either side of 100m. Mann Whitney tests were used to see if there was a difference in the distance from water bodies where mortalities occurred firstly, between males and females, and secondly between adults and juveniles.

Fig. 1. Locations of bridge sampling sites surveyed on the A82 at Loch Lomond.

Fig. 2. Locations of otter road mortalities in the Loch Lomond and The Trossachs National Park. Points numbered 1 and 2 are estimated from incomplete grid references and general descriptions.

RESULTS

Bridge suitability and usage by otters

There were no significant differences in river width ($W_{(1)}$=58, p=0.492), river depth ($W_{(1)}$=50, p=1.042) and bank width ($W_{(1)}$=63, p=0.220) between sites with either the presence or the absence of otter signs (Fig. 3.). Bridge suitability (as described in Table 1) was found to have a significant effect on the presence or absence of otter signs ($W_{(1)}$=73, p=0.016). Otter signs were detected at around half the bridges which had a permanent bank, and also at those with no major obstructions. At signs with obstructions no otter signs were ever detected. Fig. 4 displays the presence or absence of otter signs at different bridge rankings. Otter signs were found irrespective of whether or not bridges had obstructions.

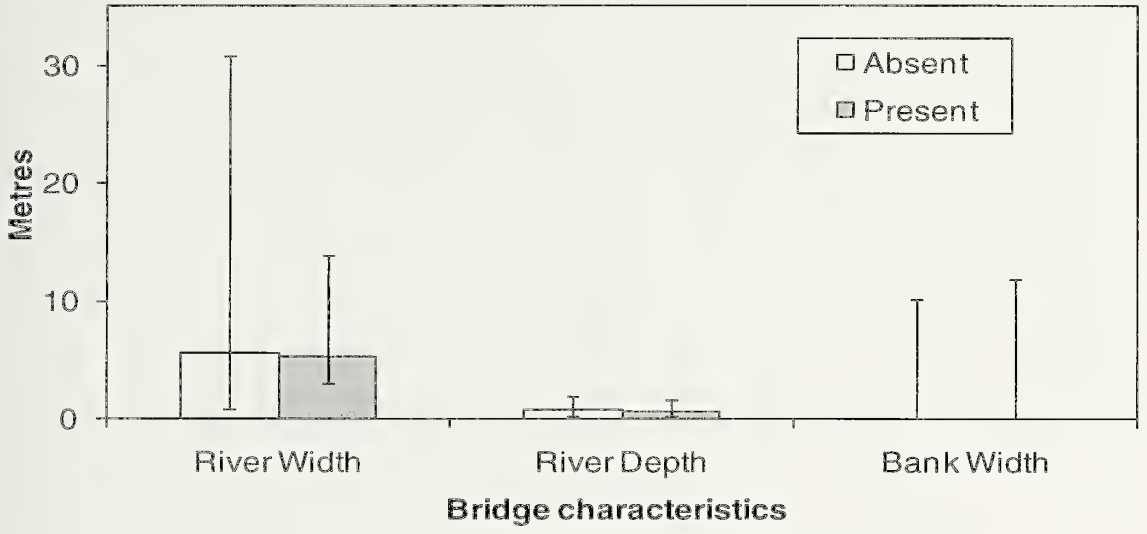

Fig. 3. Median bridge characteristics at sites with and without signs of otters (n=18). Maxima and minima are shown.

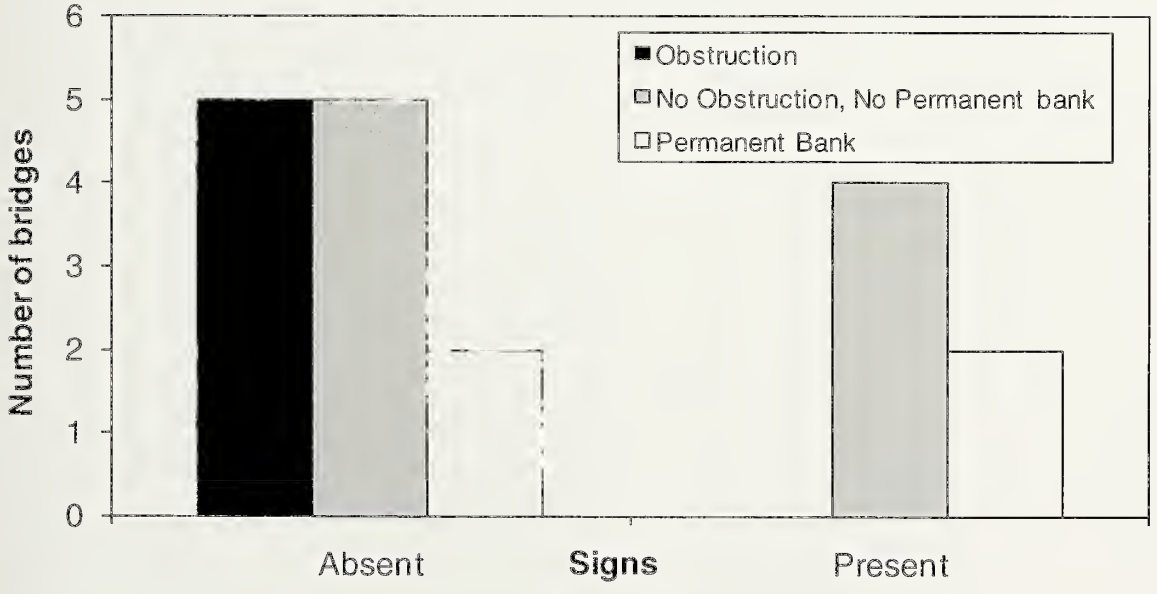

Fig. 4. The number of each bridge category at sites with and without otter signs (n=18).

Mortalities

There was no effect of year ($X^2_{(4)} = 6.32$), season ($X^2_{(3)} = 2.59$) (Fig. 5) or sex ($X^2_{(1)} = 0.82$) on the number of mortalities. In addition, there was no effect of sex on the ratio of adults to juveniles killed ($X^2_{(1)} = 0.12$) (Fig. 5).

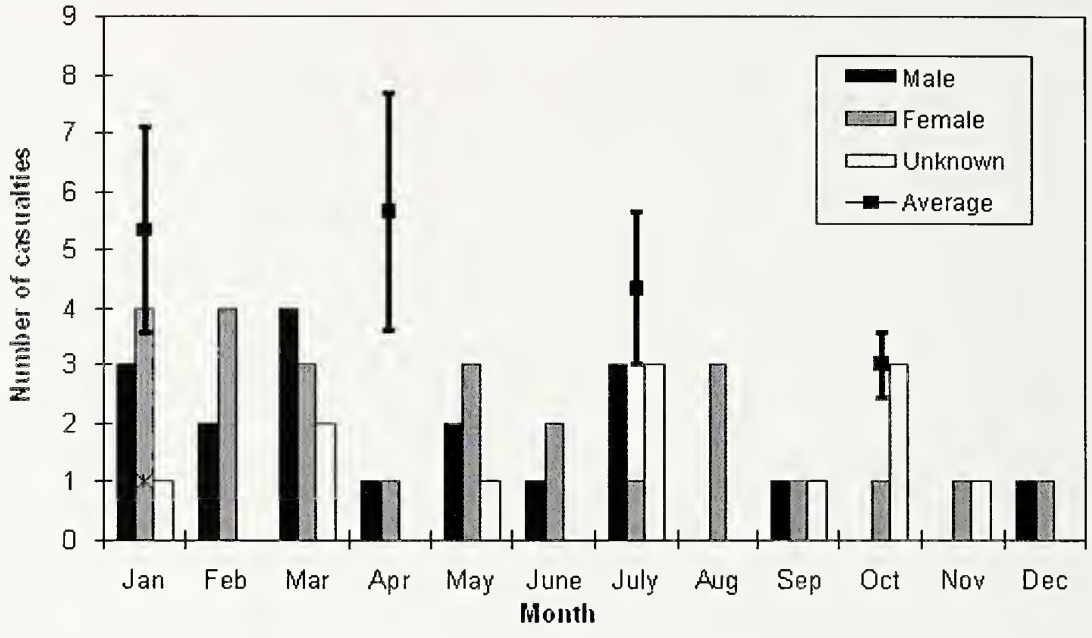

Fig. 5. The seasonal distribution of otter road casualties between 1982 and 2007. Seasonal means are shown as points with standard error bars (n=55).

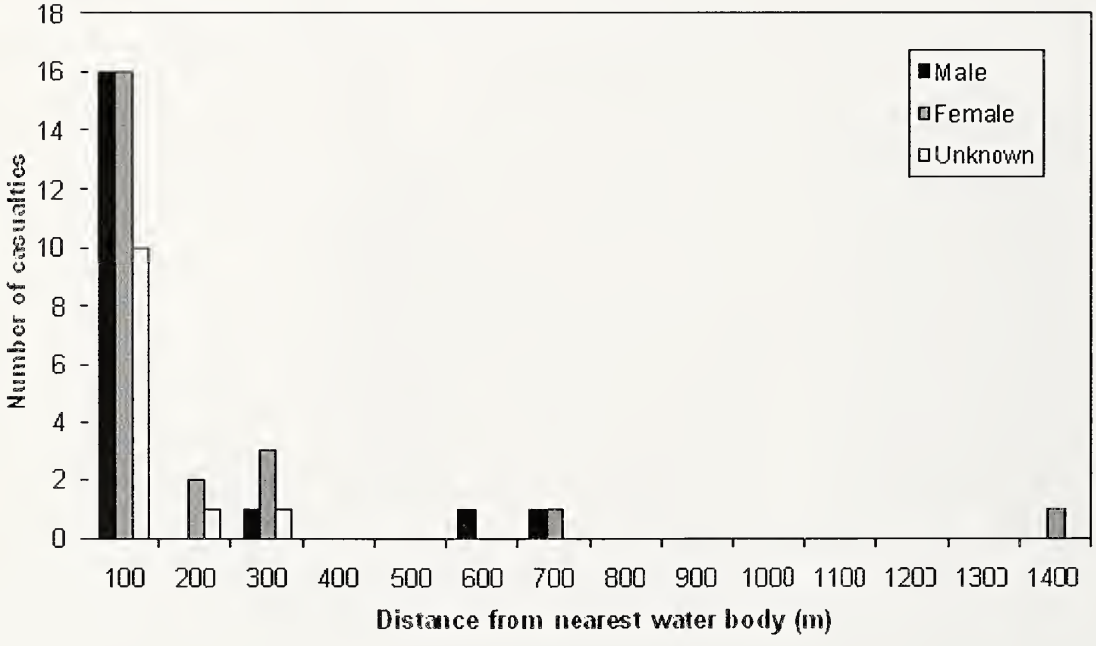

Fig. 6. Relationship between otter mortalities and distance from nearest water body (n=54).

There was found to be a significant difference ($X^2_{(1)}$= 16.67, p<0.01) in the number of mortalities that occurred within 100 metres of a water body and those at a greater distance, with 78% recorded within a 100 metre zone (Fig. 6). There was no effect of sex ($W_{(1)}$ = 402.5, p=0.771) or age category ($W_{(1)}$ = 389, p=0.6311) on the distance mortalities occurred from water.

Of the otter mortalities which occurred directly at the bridge study sites, three occurred at Site 2 (Fig. 7). Site 2 has large permanent banks, so otters do not need to cross the road. Otter signs were repeatedly found at Site 2 during the monitoring period. At Site 8, two otters were killed. The bridge at Site 8 is over 30m wide and there is a permanent bank which otters could use. Finally, one otter was killed at Site 10. The bridge at Site 10 is only 3m wide and has no permanent bank and is obstructed by several concrete ledges and wooden panels.

DISCUSSION

Even with the recent increase in otter populations otters are still relatively rare and eonserving otter populations continues to be important (Chanin, 2006). The Eurasian otter is listed as near threatened by the IUCN/WCMC and is on their red data list. Within the UK otters are a priority species in the UK Biodiversity Action Plan, and are listed under the Bern convention and the habitats directive (McCafferty, 2005a). The legislation currently in place implies an obligation to ensure the conservation of the components of the countryside that provide important habitats for otters (Kruuk *et al.*, 1998). This means that by conserving otters, their surrounding habitat will also be protected. Current conservation management schemes should be directed towards protecting habitat surrounding small streams and controlling processes which affect the composition of substrates in water bodies (Durbin, 1998).

Bridge suitability and usage by otters

Road bridges which cross wildlife corridors are often associated with detrimental impacts on local wildlife populations through habitat fragmentation and mortalities resultant from road traffic accidents (MaeDonald & Smith, 2000). This especially affects species such as mammalian carnivores which travel over large distances (Ng *et al.*, 2004). For this reason it is important to understand how otters are using existing passageways beneath bridges, and how different design features of bridges can impact on otter populations. Initially it was hoped that the fieldwork would allow for direct comparisons of frequency of otter usage between sampling sites. However the number of otter signs discovered was far lower than expected, and as a result the analysis was limited. This may be related to seasonal sprainting behaviour in the summer as otter distribution, and utilisation of stretches of water may vary seasonally (Kruuk, 1995). Whilst the presence or absence of otter signs was not related to river width, depth or bank size, overall bridge suitability did influence the oceurrence of otters. Bridge suitability was determined using two factors; firstly whether the river was unobstructed, and secondly whether the river had a permanent bank underneath the bridge. Whether or not there was a permanent bank was an approximate measure as no annual river flow information was available for the sites. Sites where otter signs occurred had a higher ranking for bridge suitability than sites where no signs of otters were found. This does not imply that there were no otters in areas where signs were absent, only that they were not leaving spraints at unsuitable bridges to the same extent.

One issue within the experimental design which may have resulted in the limited number of otter signs being detected was the small distance covered in searches. The standard sampling distance normally used in otter searches is 600m (McMahon & McCafferty, 2006, McDonald *et al.*, 2007; Strachan, 2007). Chanin (2000) highlights that there is a trade off between sampling distances and the number of sites sampled and recommends a 50m search area as a maximum. Secondly, as the summer progressed, the amount of vegetation at study sites increased. Whilst every effort was made, definitive sampling became substantially more difficult throughout the survey period.

Spraint surveys, as an indicator of otters, do have limitations. The first point which may limit spraint searches conducted in summer months is that otters are less likely to spraint on land during the summer and instead increase their level of excretions while in the water (Kruuk, 1995). This is possibly linked with the increased availability of food and a reduced need to mark resources. Previous studies have revealed that spraints last longer in dry weather than in rain or floods (Jenkins & Burrows, 1980). On several occasions the weather prior to sampling trips consisted of heavy rainfall and high water levels subsequent to periods of dry weather. This may have removed many signs of otters which had been present on the banks of the water courses. Whilst the presence of otters may be derived from the discovery of spraints, they provide no direct indication of numbers (Thom *et al.* 1998). This results from otter territories overlapping and the fact that spraints can serve both a biological function and a communication function as resource markers (Kruuk, 1995). This limitation could be overcome in future studies by radionuelide tracking methods (Kruuk, 1995), or genetic analysis of spraints (Puechmaille *et al.*, 2007).

At many of the sites, steep, near vertical artificial banks and river beds as well as blockages looked as if they had the potential to cause some difficulty to otters seeking passage. This seemed to be particularly the case for smaller streams rather than larger rivers. If these obstacles are only cutting off limited resources, then otters may reduce their usage or simply not use these stretches of water. This could be especially true when otters have easier access to equally good or even better resources in different stretches of water. However otters may prefer other areas further upstream or at different areas of Loch Lomond if there is

continual disturbance in those locations where roads and water courses meet. This may particularly affect females with cubs, which may be living reclusively, far upstream, or on islands in Loch Lomond.

Mortalities

It was thought that otter road mortalities would increase with year, due to an increase in traffic as well as an increase in the proportion of deaths that were reported. This pattern has been seen in previous studies, which also noted an effect of increasing and spreading otter populations (Chanin, 2006; Green, 1991; Hauer *et al.*, 2002a; Philcox *et al.*, 1999; Strachan, 2007). The varying volume of traffic as well as the changing road conditions across different seasons has also been proposed to determine the number of road deaths throughout the year. The sex of otters was also considered as a factor which could influence road deaths, as males are wider ranging and may be more prone to audacious behaviour resulting in increased road accidents (Philcox *et al.* 1999). In this study, the number of mortalities was not significantly affected by year, season or sex. There was also no difference in the ratio of adults to juvenile mortalities between sexes. There did appear to be a slight but non-significant trend in season with fewer deaths occurring in autumn. With a larger sample size, a clearer pattern may be revealed. As the ratio of adults to juveniles in the wild was unknown, variation from this in the mortalities could not be tested for. Changes in the ratio of adults to juvenile mortalities between sexes however could be tested for; though this also tested non-significant. The mortality data did not conform to the national database. In this study more females were killed (57%) compared to 31% in the National database. Likewise 35% of mortalities were juveniles while nationally they only account for 18%. This could be a relic of the sample sizes (this study n=62, national database n= 2109) or alternatively females and juveniles may be more vulnerable in the study area.

The mean distance of otter mortalities from a mapped water body was 139m. However, the majority of otter mortalities occurred within 100 metres of a water body. This highlights that otters are in the most danger when roads run close to or across water bodies. Although young males had previously been hypothesised to be at more risk due to travelling further to seek new territories, there was no difference between the sexes or between age groups in the distance from water at which the otters were killed.

It is important to note that a lack of knowledge of otter ecology may over-emphasise the importance of these road deaths (Philcox *et al.*, 1999). As road deaths are more noticeable than natural deaths this may cause an overestimation of the proportion of deaths caused by traffic (Kruuk, 1995). There may also be an effect of increased effort in reporting and recording of otter deaths (McMahon & McCafferty, 2006).

Mortalities near sampling sites

Out of the mortalities that did occur at or near sample sites, there was no common factor in the characteristics of the road. Otters were killed on roads which they could cross under safely, on permanent banks as well as at bridges which were obstructed. There were mortalities at wide rivers and small streams, both of varying depths. Most of the deaths did appear to happen at the south end of Loch Lomond where, from observation, the A82 is wider and straighter than at the north end. This invariably leads to faster moving traffic. There may also be a difference in the volume of traffic that uses different stretches of the A82. If this is indeed the case, it could result in different stretches of the A82 having different levels of impact on otters as increasing traffic volume has been shown to negatively impact the permeability of roads for mammals (Shelley *et al.*, 2005). This also has implications for future road development, as road upgrades can potentially increase otter mortalities as has been previously observed on the A75 (Green, 2008).

Mitigation

The recent rapid expansion of road networks has the potential to block genetic exchange and to isolate small populations (Clinton *et al.*, 2005). As otters are still recovering from previous declines in populations it is particularly important to try and alleviate any negative effects the present day transport network may have. The number of otter mortalities which occur on trunk and 'A' roads is proportionally greater than on other roads (Philcox *et al.*, 1999). The probability of otters crossing a road is related to the frequency of use, and also the suitability of the bridges for allowing otters to pass underneath (Chanin, 2006). Due to cases where otters move onto roads regardless of whether they need to or not, any introduced mitigation methods may only serve to reduce rather than prevent otter road deaths. Permanent wildlife corridors under bridges would seem the most straight forward method for allowing safe passage to otters and other animals travelling along rivers. In new bridges this can be included in their design, however on existing bridges artificial passageways may need to be installed. Where room is available a ledge running along the edges of the bridge should allow wildlife safe passage. Alternatively where room is not available, tunnels could be installed beside the bridge which would allow a permanent safe passage for otters or other small animals. Otter proof fencing should not be used to block otter passage but instead help to direct otters away from roads to suitable crossing places (Philcox *et al.*, 1999). Fencing should be used carefully as it has the potential to trap otters on roads if otters cross from a different point. Signs to warn motorists may help raise driver awareness and prevent some accidents from occurring.

Obviously any mitigation strategy will incur expense. Installing new tunnels on existing roads would seem the most disruptive and costly method. Fencing and artificial ledges may initially be cheaper but will require continued monitoring and maintenance. This reinforces the importance of building new bridges with

wildlife in mind, as sensible initial planning will reduce future costs. Designers of new roads should keep in mind that even if otters are not currently present, they may be in future (Philcox *et al.*, 1999; Chanin, 2006). The Highways Agency design manuals advise that new bridges should be built wide enough to incorporate a wildlife corridor and, if required, fencing to guide otters to suitable crossing points (Highways Agency, 1999). Road mitigation measures installed will not only benefit otters, but other species facing similar problems (Mata *et al.*, 2005). Any mitigation measures which are installed should be monitored to ensure that they are indeed working effectively (Lafontaine & Liles, 2002).

Monitoring spraints and tracks are the simplest and cheapest methods to identify sites where otters travel out of water (McCafferty, 2004). Spraints do not give accurate estimate of populations, however, they can be used to describe general spatial distribution (McMahon & McCafferty, 2006). Sprainting is more common in areas with wooded vegetation or dense cover (Bas *et al.*, 1984, Jenkins & Burrows 1980). As sprainting is non-random this does not necessarily reflect that otters prefer to spend time in wooded or densely vegetated areas (Kruuk, 1995).

CONCLUSION

Otter presence was confirmed at several sites along the major trunk road that runs through Loch Lomond and The Trossachs National Park. Sites where no signs of otters were discovered may still be used by otters, though possibly they remain in the water or travel on land less frequently or at different seasons. The majority of bridges at survey sites did not include permanent wildlife corridors, and several bridges had obstacles which could potentially obstruct safe passage underneath roads. The frequency of otter mortalities decreased with increasing distance from the nearest water body. Several otters were killed at sites where safe, unobstructed passages were available beneath bridges. It is suggested that road mitigation measures are developed to reduce otter mortality on major trunk roads such as the A82 in the National Park.

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APPENDIX

Characteristic	Sample size	Information
Bridge rating	18	Category of bridge 1= obstruction, 2= no obstruction but no permanent bank, 3= permanent bank
Otter signs	18	Spraints or prints 0=signs absent 1=signs present
River width	18	River width in metres from high water marks
River depth	18	River depth in metres from level of high water flow to deepest point
Bank width	18	Width of bank under bridge in metres at high water flow
Site location	18	6 figure grid reference

Table 1. Definition and description of variables used in analysis of otter signs and bridge characteristics

Characteristic	Sample size	Information
Mortalities	62	Total number of mortalities in data set
Year	61	Year which the mortality was recorded. In analysis grouped into five year sets (the starting year for each of the sets were 1982, 1987,1992,1997,2002)
Season	55	Season in which the mortality was recorded. Seasons defined as; Spring – March-May; Summer – June-August; Autumn – September-November; Winter – December-February
Sex	44	Male or Female
Age	51	Adult or Juvenile
Nearest water body	54	Distance in metres to the nearest loch or river from sites which have an associated 6 figure grid references
Site location	54	6 figure grid reference

Table 2. Definition and description of variables used in analysis of mortality data set

Site	Grid Reference	Maximum channel width (m)	Maximum depth (m)	Minimum bank width (m)	Signs
1	NS 373833	3.00	0.17	0.00	Yes
2	NS 356857	13.90	1.68	11.90	Yes
3	NS 353867	3.00	0.39	0.00	Yes
4	NS 353881	9.15	0.62	0.00	No
5	NS 356895	3.04	0.96	0.00	No
6	NS 357926	21.10	1.96	10.23	No
7	NS 353955	1.74	0.27	0.00	No
8	NS 346980	30.78	1.34	0.35	No
9	NS 343993	3.00	0.45	0.00	No
10	NN 337007	3.00	0.88	0.00	No
11	NN 321046	4.35	0.70	0.00	No
12	NN 321149	10.19	0.45	0.17	Yes
13	NN 318158	0.91	0.17	0.00	No
14	NN 315167	6.00	0.72	0.00	Yes
15	NN 317184	6.95	1.00	0.00	No
16	NN 319198	13.75	0.97	0.00	No
17	NN 333207	4.50	0.87	0.00	Yes
18	NN 347219	6.90	0.41	0.00	No

Table 3. Sampling site information.

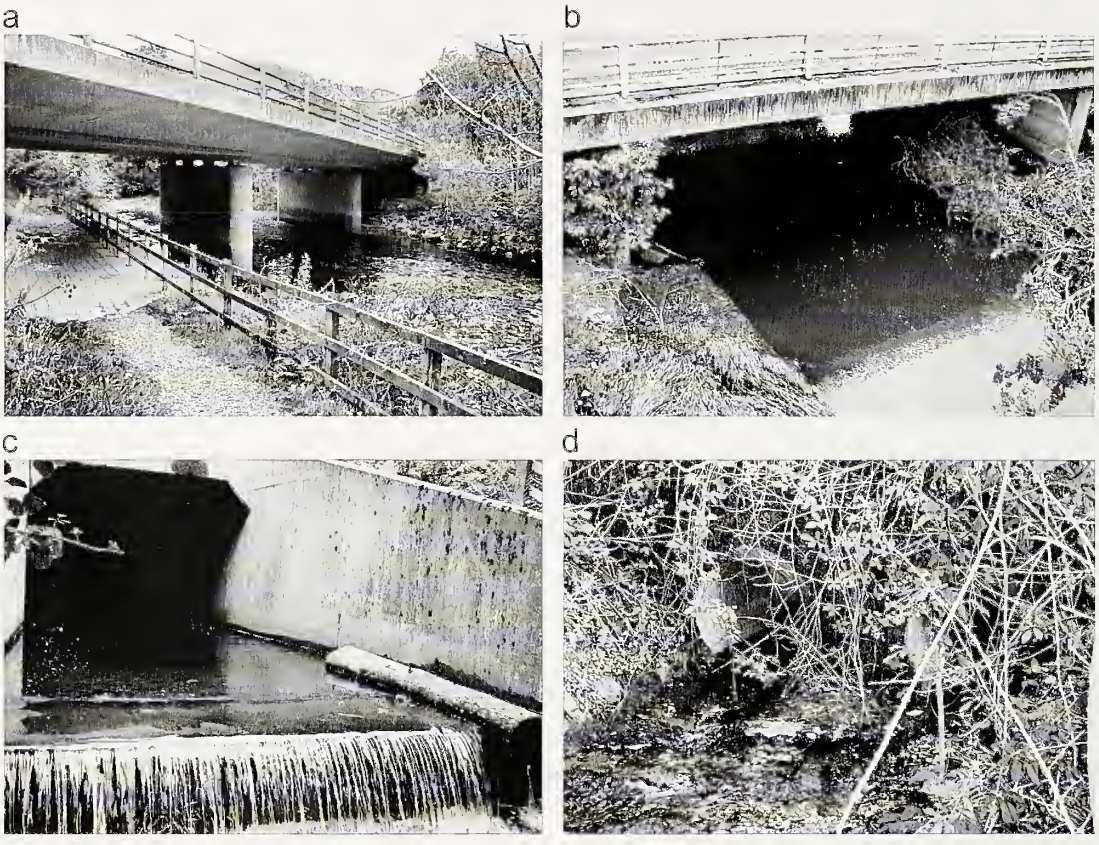

Fig. 7. Bridges with permanent bank allowing continual passage for otters and other wildlife (a): site b (NS357926) and (b): site 2 (NS356857). Bridge with no permanent bank and large concrete obstruction, potentially blocking otter passage (c): site 5 (NS356895). Culvert under bridge consisting of two concrete pipes that could prevent otter passage depending on water levels (d): site 7 (NS353955).

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Chrysochromulina associated with fish mortalities in a Scottish freshwater loch

Jan T. Krokowski

Scottish Environment Protection Agency, Redwood Crescent, Peel Park, East Kilbride, Glasgow, G74 5PP, UK.
E-mail: jan.krokowski@sepa.org.uk

ABSTRACT

The haptophyte alga *Chrysochromulina* appears to be a common component of freshwater phytoplankton communities in certain Scottish lochs during spring and summer. Toxic events associated with marine *Chrysochromulina* species have been widely reported and confirmed, although direct toxic events associated with fish mortalities in freshwaters are seldom confirmed. Fish mortalities in a freshwater loch in Scotland (Strathclyde Loch) were reported during May 2008 and were associated with abundant *Chrysochromulina*. Although no toxicity tests were carried out, past history of *Chrysochromulina* events in freshwaters should not discount the possibility that this may represent the first report of *Chrysochromulina* toxicity in a Scottish freshwater loch.

INTRODUCTION

The haptophyta consist of 80 genera and 300 species, with only about a dozen genera known from freshwaters, and only five recorded from the British Isles (Preisig, 2002). *Chrysochromulina* are mostly found in brackish and marine habitats, and although more than 50 species are detailed in total, only 4 freshwater species are known (*C. breviturrita* Nicholls, *C.inornamenta* Wujek & Gardiner, *C.laurentiana* Kling, and *C.parva* Lackey), with *C.parva* being the only one reported from the British Isles (Preisig, 2002).

Although freshwater *Chrysochromulina* appear to be widely distributed within the British Isles (Parke *et al.*, 1962; Lund, 1961), the small and fragile nature of the cell may lead to it not being so easily identified, especially in samples preserved with Lugol's iodine. In Scotland, *Chrysochromulina* has been detected in a number of Scottish freshwater lochs during spring and during late summer (SEPA unpublished data).

Toxic events associated with blooms of *Chrysochromulina* in marine waters have been extensively reported leading to extensive fish mortalities. There are relatively few toxic reports associated with *Chrysochromulina* in fresh waters. In north American lakes, *C.breviturrita* was suspected as being toxic to tadpoles and producing obnoxious odours (Nichols *et al.*, 1982), whereas dead fish (roach, perch and pike) associated with *C.parva* were observed in a small Danish lake (Hansen *et al.*, 1994). Very high densities of *Chrysochromulina* were also reported from a small lake in Lincolnshire, England during 1997, which was associated with an extensive fish mortality (SJ Brierley pers. comm). No associated fish mortalities, however, have so far been reported from any Scottish freshwater loch.

METHODS

On May 6, 2008, following a period of warm, sunny weather, fish mortalities were reported from Strathclyde Loch (North Lanarkshire, Scotland, NS 7269 5734). The man-made loch is approximately 0.8km^2, situated 20km south-east from Glasgow, Scotland, and is used for a range of recreational activities. The main inflow to the loch comes from the South Calder Water in the north-eastern part, with the main outflow/spillover to the River Clyde in the southern end of the loch.

Water samples were taken at a site in the north-eastern part of the loch (Fig. 1), as far away from the shore as practical, for chemical and biological (phytoplankton) analyses and were analysed following standard Scottish Environment Protection Agency procedures. Additional water samples were taken from the same site a week later, and continued at roughly 2 day intervals, terminating on 27 May. One additional sample was also taken on June 3. On these subsequent surveys, live phytoplankton were immediately examined (inverted microscope method, Leica DMIRB, up to x640 magnification), whereas additional samples were also preserved with Lugol's iodine solution for microscopic enumeration and biovolume assessment (Carvalho *et al.*, 2007).

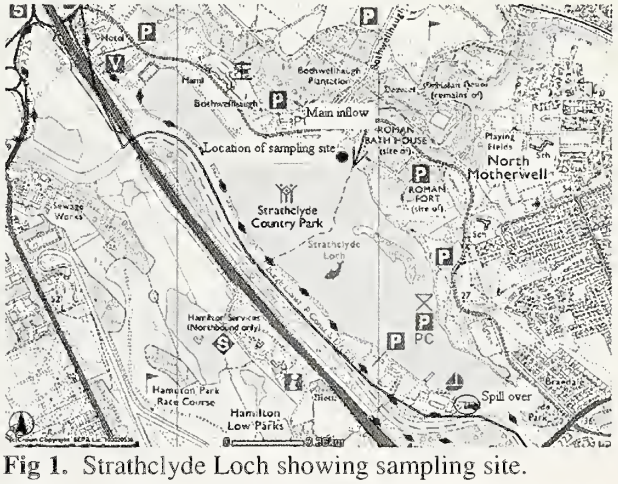

Fig 1. Strathclyde Loch showing sampling site.
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RESULTS

In the period from 6th May up to mid May 2008, approximately 2000 small fish (less than 10cm long) and between 40-50 larger fish (23cm long), mainly roach (*Rutilus rutilus*) and bream (*Abramis brama*), were found dead washed up on the shore. The loch contains a mixture of other fish, such as perch (*Perca fluviatilis*), pike (*Esox lucius*), tench (*Tinca tinca*) and stickleback (*Gasterosteus aculeatus*), which appeared to have been unaffected, although two dead pike were also found washed up on the shore. On initial and further inspection, no evidence of pollution was indicated, and an ecological survey indicated no dead or dying invertebrates. Water chemistry results indicated relatively high dissolved oxygen concentrations (highest 175%saturation), temperature (19°C) and pH 8.6, which declined towards the end of the sampling period (Table 1).

Determinant	6 May	16 May	28 May	3 June
Dissolved oxygen %saturation	136	175	93.5	-
Temperature °C	19	16	13	-
pH	8.6	-	-	8.44
Conductivity µS/cm	617	-	-	601
Total oxidised nitrogen mg/l	0.412	-	-	0.747
Ammoniacal nitrogen mg/l	<0.04	-	-	0.058
Orthophosphate mg/l	0.128	-	-	0.018

Table 1. Selected water chemistry results, Strathclyde Loch, site near the South Calder inflow.

	Relative abundance
Cyanobacteria	
Aphanothece cf. clathrata W. et GS West	+
Centric diatoms	
Stephanodiscus hantzschia Grunow in Cleve et Grunow 1880	+++
Pennate diatoms	
Diatoma tenue var. elongatum Lyngb.1819	+
Nitzschia acicularis (Kütz) W.Sm 1853	+
Cryptophyta	
Cryptomonas spp.	++
Rhodomonas lacustris var. nannoplanctica (Skuja) Jav.	++
Chlorophyta/Chlorococcales	
Lagerheima genevensis (Chodat) Chodat	+
Monoraphidium contortum (Thur) Komárková-Legnerová	+
Monoraphidium grifithii (Berk) Komárková-Legnerová	+
Scenedesmus communis Hegewald	+
Chlorophyta/Klebsormidiales	
Koliella longiseta (Vischer) Hindák 1963	+
cf. heterotrophic flagellates	++
Haptophyta	
Chrysochromulina parva Lackey 1939	+++

+ present, ++ common, +++ abundant

Table 2. Dominant phytoplankton recorded 7 May 2008, Strathclyde Loch.

Examination of live phytoplankton on 7 May indicated an abundance of the diatom *Stephanodiscus hantzschia* along with unidentified flagellate nanophytoplankton, which on subsequent examinations were identified and confirmed as *C.parva*. The dominant phytoplankton recorded are shown in Table 2.

C. parva abundance declined over May from maxima of 11,500 cells/ml to its lowest by June (15 cells/ml). The biovolume however remained relatively unchanged through most of early May (between 0.36 $x10^6$ – 0.48 $x10^6$ μm^3/ml), and only declined by end May (Figs. 2-3).

Diatom abundance and biovolume fluctuations were similar, with abundance declining from its maximum of 34,800 cells/ml to its lowest by June (153 cells/ml), whereas the biovolume declined from 5.9 $x10^6$ to 0.02 $x10^6$ μm^3/ml over the same period.

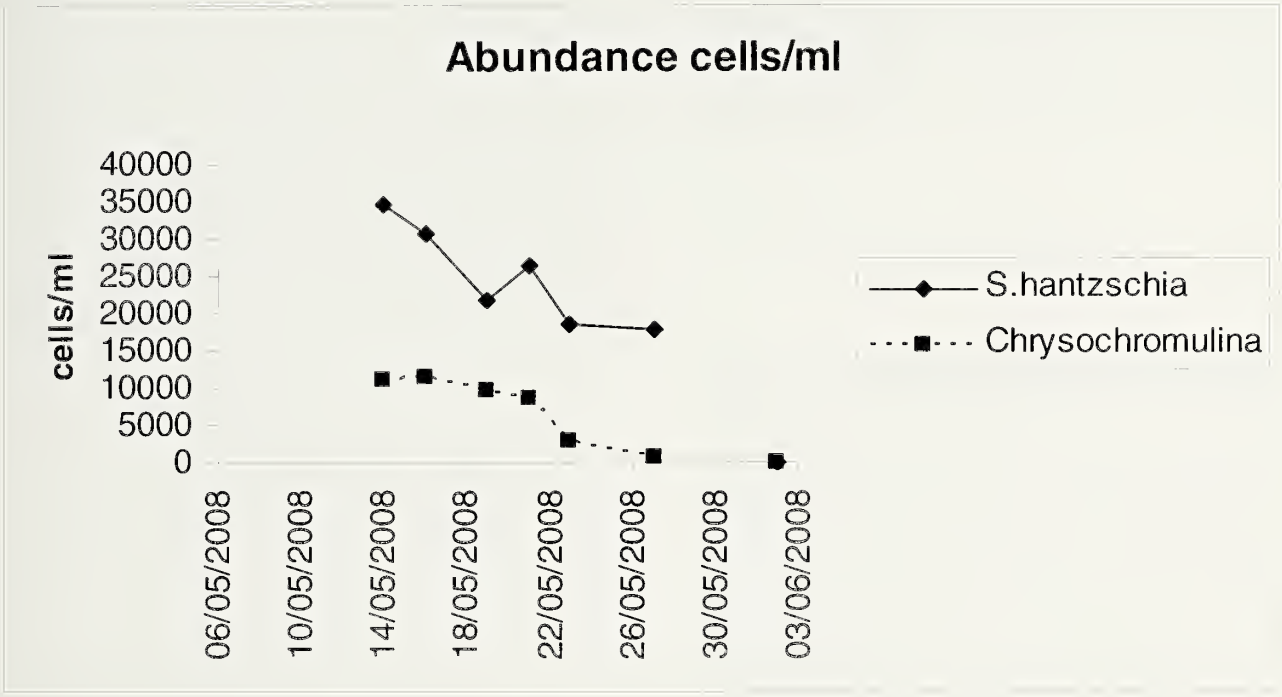

Fig. 2. Abundance of the two dominant algae in Strathclyde Loch.

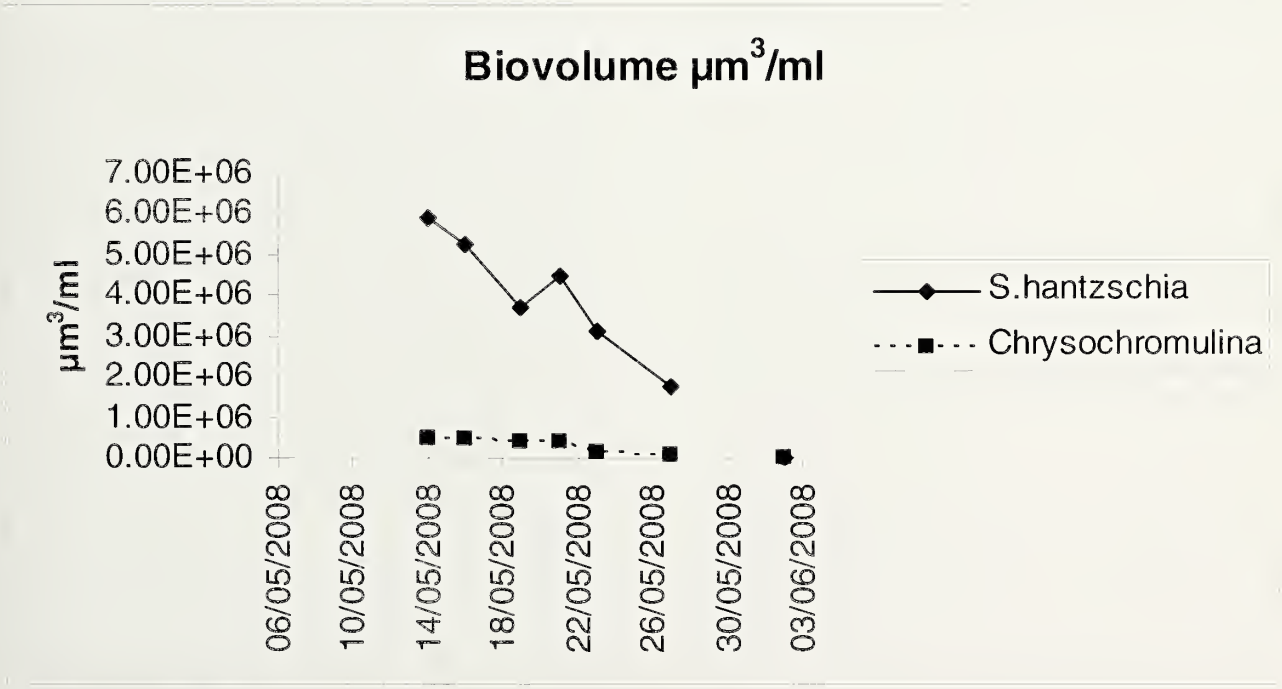

Fig. 3. Biovolume of the two dominant algae in Strathclyde Loch.

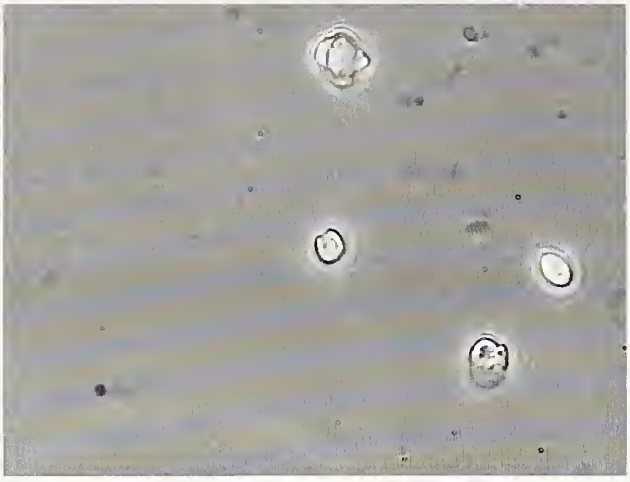

Fig. 4a. Live *Chrysochromulina. parva* Lackey from Strathclyde Loch (14/05/2008), x400 mag., phase contrast, Leica DMIRB. The cell is 5 µm in length, with a visible long straight haptonema 70 µm long, and two flagella at either side 10-12 µm long.

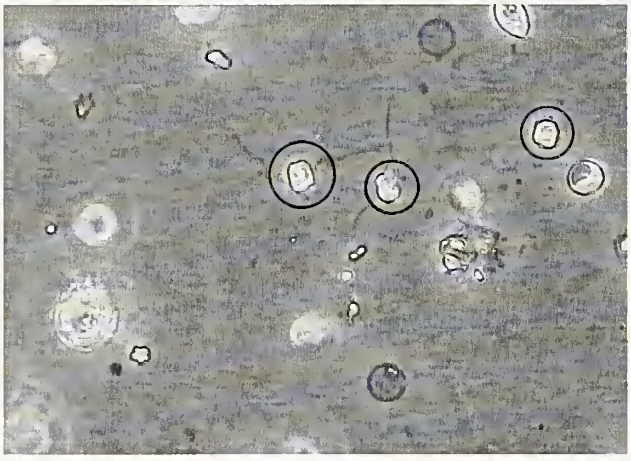

Fig. 4b. Same sample following preservation with Lugol's solution, showing distortion of *Chrysochromulina* cells (circled), flagella are visible but haptonema is hidden/coiled. x400 mag., phase contrast, Leica DMIRB.

DISCUSSION

It is highly likely that *C.parva* was missed in the initial examination and was recorded as an unidentified flagellate nanophytoplankton due to the alga's extreme fragility, as the sample was not examined soon after collection. No further unidentified flagellate nanophytoplankton of the type were recorded in following examinations.

Toxic events associated with blooms of *Chrysochromulina* have been extensively reported primarily from marine waters and have led to extensive fish mortalities, and have also been associated with zooplankton, mollusc, sponge and crab mortalities. Unusually, toxic events associated with *Chrysochromulina* have also resulted in dead and dying red macroalgae *Delesseria sanguinea* (Smayda, 2006). Such reports of *Chrysochromulina*-associated fish mortalities are principally attributed to *C. polylepis* and *C.leadbeateri.* Hansen *et al.* however, reported mortalities of caged rainbow trout in the southern Kattegat, Lillebaelt region of Denmark, associated with a mixed bloom of *C. brevifilum*, *C.ericina*, *C.hirta* and *C.spinifera*, with fish dying mainly during the early bloom stages when cell concentrations were between 10,000 and 30,000 cells/ml, with the maximum *Chrysochromulina* concentration of 50,000 cells/ml (Hansen *et al.*, 1995). Although the cause of the farmed fish mortalities was unclear, the effects on the fish suggest that one or several *Chrysochromulina* species may be toxic.

In freshwater systems, *C. parva* were mostly abundant in the summer but also common in spring, with densities of 20,000 cells/ml recorded in spring in a number of Lake District lakes and tarns (Parke *et al.*, 1962). Lund reported densities of 32,000 cells/ml, without associated fish mortalities in Esthwaite Water during June (Lund, 1961). Periodicity was not apparently driven by fluctuations in temperature or light. Kristiansen reported *C. parva* densities of 50,000 cells/ml also without associated fish mortalities (Kristiansen, 1971). Relatively higher densities of *C. parva* (614,000 cells/ml) were reported in a small Danish lake during June, with dead fish being reported from the beginning of May (Hansen *et al.*, 1994). This would have represented the first report of toxicity in a freshwater *Chrysochromulina* had toxicity tests been carried out.

In Scottish freshwater lochs, *Chrysochromulina* would appear to be a scarce component of the phytoplankton community occurring primarily during the spring and late summer, although the relative small size of the alga (diameter between 5-6µm), its extreme fragility, and the difficulty associated with identifying it from preserved samples may have led to the alga being under-reported in fresh waters. Surveys of a number of Scottish freshwater lochs in 2007 indicated the presence of *Chrysochromulina* during July-September 2007 at low concentrations of between 10s-100s cells/ml, with concentrations of 1,019 cells/ml recorded from Loch Scadabhagh (North Uist) during September 2007, and 2,415 cells/ml from Loch Ussie (near Dingwall) in July 2007 (SEPA unpublished data). Analysis of a water sample from a small pond in Biggar (Lanarkshire) during October 2006 detected *Chrysochromulina* at densities of 4,215 cells/ml, with their presence again noted during May 2008. *Chrysochromulina* was also noted in Lochend Loch (North Lanarkshire) during May 2008 at densities of 1,447 cells/ml. There were no reported associated fish mortalities at any of these sites (SEPA unpublished information).

The abundance of *Chrysochromulina* in Strathclyde Loch, with maximum cell concentrations of 11,500 cells/ml during May, was at the lower range of concentrations reported so far from freshwaters, but within concentrations reported from marine waters where fish mortalities were detailed. The bloom during May 2007 could be regarded as a high

population density, low biomass bloom, consistent with previous blooms of *Chrysochromulina* (Smayda, 2006). High population density, low biomass blooms are regarded as harmful not because of their toxicity, but because their high population density and small size may lead to clogging of feeding appendages (Smayda, 1997), and perhaps also fish gills. The unexplained fish deaths at Strathclyde Loch could also be due to a combination of factors such as stress from the relatively high temperature, high dissolved oxygen and pH in the water, which all declined at the end of the sampling period. Irritation/clogging of fish gills with diatoms, and possibly bacterial exotoxins associated with die-off of the diatom bloom could be additional factors leading to fish mortalities (Environment Agency, 2003).

The abundance of *Chrysochromulina* however, although at relatively modest concentrations, and its past association with fish mortalities may suggest a toxic effect. The possibility of *Chrysochromulina* toxicity in Scottish freshwater lochs therefore deserves future monitoring.

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Two Victorian Botanists: Professor Roger Hennedy and Professor George Francis Scott Elliot

Eric W. Curtis

2 Rosslyn Terrace, Glasgow, G12 9NB

INTRODUCTION

Professor Blodwen Lloyd Binns, to whom the Society is indebted for her very generous bequest, rediscovered the long lost herbarium of the then Royal Technical College in the early 1950s. During the years 1954 to 1962 she compiled a meticulous catalogue, since used as the primary source for data entry into a computerised data-base (Macpherson, P. & Watson, K., 1996). She published an account of the herbarium - which is now held in the safe keeping of the City at the Museums Resource Centre - in the *Glasgow Naturalist* (Lloyd, B., 1964). In this she noted that three of her predecessors at the College (now the University of Strathclyde) had made major contributions: John Scouler, Roger Hennedy and George Francis Scott Elliot. She recorded a brief account of Scouler's life in the *Glasgow Naturalist* (Lloyd, B., 1961), and hoped to be able make a more detailed study of him. She also wished to publish a record of the careers of Hennedy and Scott Elliot, although time proved to be against her. When making her bequest she suggested that it would be appropriate to record their lives in the *Glasgow Naturalist.** Various notes made by her have been useful in helping to provide the following account of their lives and achievements. An account of her own life is recorded in the *Glasgow Naturalist* (Macpherson, P., 1992).

Hennedy and Scott Elliot both made significant contributions to our knowledge of the Scottish flora, and both were active members of forerunners of the Glasgow Natural History Society. Their careers spanned the Victorian Age but Hennedy was born in Georgian times and Scott Elliot lived well into the 20th Century. Hennedy spent most of his life in Glasgow but Scott Elliot was only here for about six years and his most noteworthy work was exploring and studying the flora of Africa. They never met and came from very different backgrounds.

*It was a pleasure to me to be asked to write this paper as I had one of those "small world" coincidences involving Professor Lloyd Binns. My father, while stationed at the R.N.A.S airship station on Anglesey during World War I, became a close friend of Siân Williams who was later to become the daughter-in-law and confidant of John Lloyd Williams, Professor of Botany; the much-admired lecturer of Professor Lloyd Binns. In later years I was able to bring the two together. Although they never met, they established a close friendship by telephone, and had long and vigorous conversations which added pleasure to their last years.

ROGER HENNEDY (1809 – 1876)

Professor Hennedy (Fig. 1) is well known as the author of *The Clydesdale Flora* (Hennedy, 1865). This ran to five editions, two of which were published after his death. The final edition was a revision by Professor Thomas King, a successor of Hennedy, (Hennedy & King, 1891) and it was only superseded by the publication of Lee's "Flora" in 1933 (Lee, 1933). It had thus proved its value as the standard local flora for nearly 70 years; a period of greatly increased popular interest in nature studies.

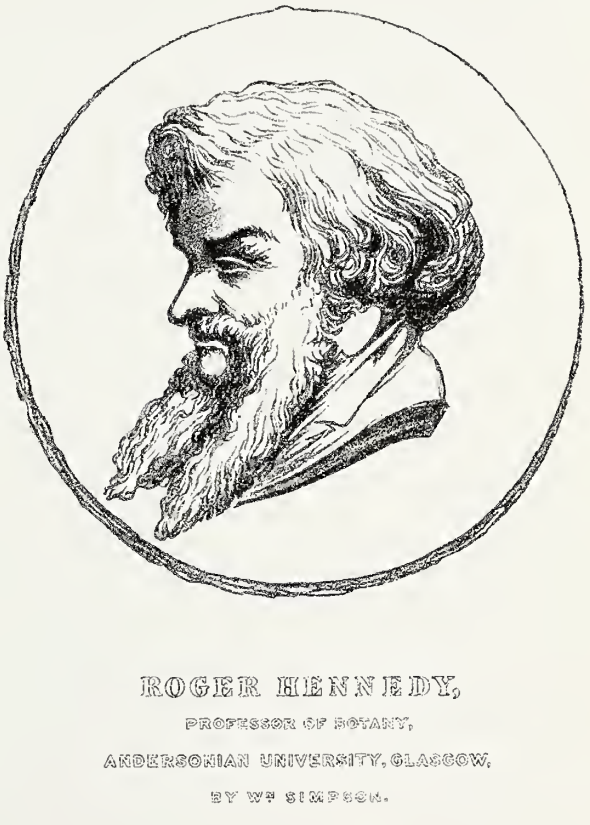

Fig. 1. Roger Hennedy Professor of Botany Andersonian University, Glasgow, 1863 – 1876 by William Simpson.

Roger Hennedy was born in 1809 at Carrickfergus, near Belfast, of Scottish parentage. His family had changed the initial letter of their surname from K to H. This may

sound more Irish but it is strange as Kennedy had been quite a common name there since the 'plantations' of Lowland Scots to Ulster, initiated in the reign of King James VI.

Hennedy followed an unusual career path for a professor of Botany. His life is traced by his friend William 'Crimea' Simpson, the famous war artist, in a biographical note published in an 'In Memoriam' edition of his *Clydesdale Flora* (Hennedy, 1878).

From the age of two he lived with his grandfather, who ran a local store, and as he grew up Roger helped him. After his grandfather's death he became apprenticed as a block cutter to a local calico printer. However, finding his master 'tyrannical' he ran away to Scotland where he completed his apprenticeship with a Rutherglen firm of calico printers. In 1832 he left to join the Customs in Liverpool, but finding this uncongenial he soon returned and joined a firm of muslin printers, again as a block cutter.

By this time, however, lithography was replacing the block cutting method of printing in the textile industry and he adapted to the change. He became very skilled at the new process and he designed new patterns, mainly of floral designs, which he then transferred to the stone. His developing skill in drawing led to a closer interest in plants, and in 1838 "owing to a lull in his work, he went to Millport, Isle of Cumbrae and took up the study of Botany merely to pass away the time". It was here that he also developed a special interest in diatoms, for which he was to become a recognised authority. However, he continued his career as a designer of muslin patterns, working for two other firms before setting himself up with a partner in manufacturing sewed muslins. His botanical interest consumed all his spare time, and in 1848, following the founding of the Athenaeum, he started to teach a small botanical evening class. A year later he also started lecturing at the Mechanics' Institute.

On 2 July1851 the Natural History Society of Glasgow was formed by nine "gentlemen interested in the pursuit of natural science" and Roger Hennedy joined them a few days later when John Scouler addressed them and was elected their first Honorary President (Sutcliffe, 2001). Scouler had been a Professor in Dublin since 1834, having previously been Professor of Natural History at Anderson's University. Hennedy, however, still continued in the muslin trade. According to the Post Office Directories (which are not always reliable) he set up his own business as a sewed muslin manufacturer in Queen Street in 1856 and this continued until 1871. Meantime in 1863 he was appointed Professor of Botany at the then Andersonian University, a post he held until his death in 1876.

William 'Crimea' Simpson attended his first classes at the Athenaeum and they became firm friends. They went on excursions together, Hennedy botanising and Simpson sketching. They both got to know Hugh MacDonald, author of *Rambles Around Glasgow* (MacDonald, 1854), who, like Hennedy, had been apprenticed as a block cutter to a calico printer.

In MacDonald's book there are references to the two of them, although not by name (*vide* Simpson, 1903), on an excursion to Robroyston and Chryston, when Simpson was on a return visit to Glasgow. "Our flower-loving friend is now in all his glory poking and prying along the vegetable fringe that skirts the path. Every now and then we are startled by his exclamations of delight, as some specimen of more than ordinary beauty meets his gaze". MacDonald stresses the breadth of Hennedy's natural history interests, and ends in his inimitable melodramatic Victorian style when Hennedy picks up a toad: "Of course, we shrink back in disgust, but that won't satisfy our philosophical friend who talks contemptuously of ignorant prejudice [and gives] an account of the monster's habits and mode of living" before letting "the loathsome creature crawl away". Meanwhile "Our artistic companion ... set himself down ... to transfer a *fac-simile* ... into his sketch book". The book includes a copy of the sketch Simpson had made of Cardarrock House on this outing.

Simpson corresponded with both Hennedy and MacDonald from the front during the Crimean War, and Hennedy's herbarium includes a specimen of a *Linum* sp. collected on 13 December 1854 from "The Valley of the Shadow of Death" (*vide*: The Charge of the Light Brigade).

Hennedy also became closely associated with Walker Arnot (Regius Professor of Botany, University of Glasgow). They conducted a scientific correspondence for over 20 years and also went on excursions together, Hennedy then especially collecting diatoms. On one occasion they were near a group of colliers who were puzzled by their antics. Hennedy overheard one of them saying of him: "that wee ane's daft, he's clean gyte; see, he's gathering glaur and pittin'd in a bottle".

His interest in diatoms is commemorated in *Navicula hennedyi* W. Smith, and *Toxarium hennedyanum* (Gregory) Pelletan. The eminent phycologist William Henry Harvey named an Australian genus of Rhodophyta (Red Algae) in his name - *Hennedya crispa* Harvey & Arnot - as well as a species first found off the Isle of Cumbrae - *Actinococcus hennedyi* Harvey, the valid name of which is now said to be *Haemescharia hennedyi* (Harvey) Vinogradova & Yacovleva.

An interest in mosses also brought him a commemorative generic name: *Hennediella* J.N.Paris. This genus is found mainly in North America, but as an alien elsewhere, including the British Isles. It has recently been recognised as a more important genus than originally thought. It is even referred to in *A Short History of Nearly Everything* (Bryson, 2003) and a revision has been published listing 15 species (Cano, 2008).

Hennedy recounted to Simpson how he collected a large specimen of Royal Fern (*Osmunda regalis*) one Sunday morning, at a time when the Sabbath was strictly

observed. With bad timing he found himself walking through a village as the 'Established' Kirk was 'skailing' and he passed a long procession of serious faces. To his even greater embarrassment he then passed the Free Kirk as the congregation was coming out and he was mortified when they showed their astonishment at seeing him walking along with his copious plant on such a day!

Simpson records that Hennedy was of a rather solitary nature, and spent his time studying alone well into the night. He had little regard for money and often gave his time freely to his students. His wife, Margaret, the daughter of David Cross of Rutherglen, is recorded as: "a lady whose energy and industry in relation to her husband's work deserves better mention that can possibly be given..." (Simpson in Hennedy, 1878).

The family lived at Grafton Place, close to the College, and the 1861 Census Returns show they have five grown up children living with them. Three girls and one son, William, are recorded as working with their father as "sewed muslin manufacturers". William appears to have had some botanical interest as the herbarium includes three of the rarer alpines on Ben Lawers and a specimen of the Fortingall Yew collected by him. Their second son, David, a salesman, is recorded in the Post Office Directories from 1869 as D. Hennedy & Co., with the same business address, in Queen Street, as his father. By the 1871 Census, when Roger Hennedy is a Professor of Botany, the other children have left home. Shortly after this they moved to Whitehall, Bothwell and, according to the Post Office records, son David continued to live there until 1891. Roger Hennedy died in 1876 at his home in Bothwell.

The accompanying sketch of Hennedy is by Simpson, who explained how it was made: "He would never have allowed a portrait of himself to be done. I chanced to be on a visit only a few weeks before his death. ... As the family were anxious to have some resemblance of him, I made notes of his face, without his knowledge, ... and have been able from them to make something of a likeness". In 1886 it was "decided a memorial for the late Mr. Hennedy should take the form of a marble bust to be placed in Anderson's College" (Proc. Nat. Hist. Soc. Glasgow 1886). Although this was done, its present whereabouts is not known. However, Simpson also made an oil painting from the sketch, and this is held in the Collins Gallery.

GEORGE FRANCIS SCOTT ELLIOT
(1862 – 1934)

Scott Elliot (Fig. 2) was born in Calcutta in 1862 where his father, a member of a distinguished Borders family, was a merchant. His mother belonged to the Huguenot family of Durand.

He went to Cambridge in 1879 where he obtained a B.A. (mathematical tripos). After this he studied for his B.Sc. in Edinburgh, where he then assisted Professor Dickson (formerly Regius Professor of Botany, Glasgow), in conducting a practical class in botany.

Fig. 2. George Francis Scott Elliot Lecturer in Botany Glasgow & West of Scotland Technical College 1896 – 1903.

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However, he was to become a very widely travelled botanist and a prolific writer. "Wanderlust was one of our friend's marked attributes. It soon became most insistent. He left Edinburgh to visit the Canary Isles" (North Western Naturalist, 1934). His first major expedition was to South Africa, Madagascar and Mauritius in 1888-89. He had spent about 10 months botanising in South Africa when in December "I happened to be in Port Elizabeth. A ship was sailing for Madagascar and I yielded to an irresistible longing to go there". (Scott Elliot Family Papers). His Madagascar plant collection proved to be of special interest and is reported in a paper read to the Linnean Society on 5 June 1890 (Scott Elliot, 1890a). Several species were named after him, including five orchids by the specialist at Kew, R. A. Rolfe (Scott Elliot Family Papers). He himself named two new genera which remain mono-specific: *Leucosalpa*

madagascariensis (Scrophulariaceae) and *Camarotea souiensis* (Acanthaceae). Although he travelled quite widely in the island his collections were mainly from the south-east, in the Fort Dauphin area.

He followed this up with a plant collecting expedition to Libya and Egypt, before being appointed botanist to the Franco-British Delineation Commission (1892-1893) charting the frontier of Sierra Leone. Again he discovered many new plant species. An account of these was given by him at a meeting of the Linnean Society on 16 March 1893 (Scott Elliot, 1895a). He introduced his paper by commenting: "The results have been, to me at least, most disappointing". He felt that 5½ months "of which 30 days were rendered blank through fever and weakness" was far too short when compared with the years spent by other botanists. He would evidently have preferred to be a pioneer as he complained of "the extremely thorough way in which the flora had been already studied".

Despite this, he managed to bring home about 1170 specimens, including 50 or 60 new species, which are described in his paper. He acknowledges "the kindest and most unremitting assistance [from many of the botanists] at Kew ... and the British Museum ... I have to thank these gentlemen for the descriptions which they have kindly given for insertion in this paper". There are detailed descriptions in Latin of the new species; many of them are his own. Although a good number of these names are descriptive, some are commemorative. He acknowledges one of those earlier pioneers, the Swedish botanist Adam Afzelius, with *Uvaria afzelii* S. Elliot (Anonaceae). The Kew botanist W.P. Hiern named *Mara elliotii* (Ebenaceae) in his honour - a compliment he returned with *Ixora hiernii* S. Elliot (Rubiaceae). Similarly *Jasminum bakeri* S. Elliot was a compliment to another Kew botanist, specialising in Malvaceae, who had named *Hibiscus scotellii* E.G. Baker. C.B. Clarke and A.B. Rendle, both at Kew, named *Commelina elliotii*, and a grass was named by Rendle as *Eragrostis scotelliana.* At least his achievements had brought him more permanent botanical recognition!

Scott Elliot's most significant expedition was to East Africa exploring the Ruwenzori Mountains, Lake Tanganyika and down to the Zambesi. He had received a grant from the Royal Geographical Society and reported his experiences to a meeting of the Society on 8 April 1895 (Scott Elliot, 1895b). This was attended by geographical luminaries of the time and Henry Morton Stanley gave a lengthy critique. There was some geographical disagreement, but in mitigation, Stanley said: "I see the two best qualities of the explorer exhibited - first, the nosing quality, untiring inquisitiveness, a desire to know; and secondly, the quality of perseverance". Professor John Walker Gregory (*vide* the Gregory Building, University of Glasgow) emphasised the importance of the geological specimens which he had collected and congratulated him on his brilliant contribution to the geography of Equatorial Africa.

His exploration of the mountain mass of the Ruwenzori - which lies in western Uganda and partly in what is today the Democratic Republic of Congo - proved to be most significant. Although named by Pliny the "Mountains of the Moon" they had been little explored and the flora was until then virtually unknown.

As he neared the Ruwenzori on 29 March 1894: "I was prostrated on the march by a severe fever ... and was carried down to the shore of the Albert Edward. [Now called Lake Edward, it had been discovered by Stanley six years before and named by him after the then Prince of Wales]. That afternoon I had the most exquisite view of Ruwenzori which I ever had, and I really think the finest landscape I have ever seen. ... the sharp and jagged ridges of the mountains with a few glittering peaks of snow were clearly outlined against the bright sunset sky". The next night he noted extraordinary swarms of mosquitoes and a rhythmical chorus of frogs, but more serious was the presence of numerous leopards. Two of his porters were severely wounded: "I had to sew up their wounds by candlelight with an ordinary needle and thread".

He found that above about 5,400 feet the typical Ugandan flora (with elements of Congo and West African plants) gave way to plants also found on Mount Kilimanjaro and the Ethiopian mountains.
"From 8,600 feet to 10,000 feet there is a zone of bamboos, particularly on the eastern side. Above this level there is a regular sphagnum peat-moss, in which one often sinks to the knees. Sometimes this is covered by a wood of stunted gnarled trees of heather festooned with grey lichens. In the more sheltered ravines one finds these growing to an enormous size, often with a diameter of 2 feet! There are also tree Senecios, tree Hypericums, the arborescent *Lobelia stuhlmanii*, which is 7 to 8 feet high, and quantities of brambles which are often as big as mulberries. ... Amongst the heather in the bare places, at about 10,000 feet, one finds an abundance of the delicate *Viola abyssinica.* There are also *Cerastium africanum,* Cardamines, Forget-me-nots, Epilobiums and a variety of beautiful orchids. Amongst these one finds quantities of little blue butterflies as well as Acraeas, and very numerous Bombylid flies and small Hymenoptera".

The whole expedition had proved to be a great success. He had discovered a large number of new species, including many endemics. In all he had collected 2700 herbarium specimens, as well as many insects, and other animal species, including a chameleon, later to be named *Chameleon elliotii* Gunth. A detailed account is given in his 413-paged book A *Naturalist in Mid-Africa* (Scott Elliot, 1896a). The Scott Elliot Pass, reaching a height of 14,350 feet, is today a highlight of a seven-day adventure tour through these mountains.

In an article on *The Best Route to Uganda* (Scott Elliot, 1895c) he shows that he is a man of his period with ambitions for the British Empire. He is fearful that "our colonies in South Central Africa and East Africa will

be isolated for all time" and suggests that Germany (then moving into Tanganyika) would be willing to give a connecting route in exchange for land in the West African colonies. He later developed his imperialistic commercial views in a paper read to the Royal Philosophical Society of Glasgow: *The Prospect of Chinese Trade and Present Opportunities* (Scott Elliot, 1899). He claimed that "the best site for industrial enterprise in the world is the Yangtse Valley" and, although noting that "China is capable of becoming a serious trade rival", he put forward an ambitious plan to encourage Germany to cut off Russian expansion into China from the north while Britain moved from the south to establish a trade monopoly in the Yangtse Valley.

Shortly after returning to Scotland, in April 1896, he married Annie Johnston-Stewart of Glasserton, near Whithorn. He was greatly devoted to her (Scott Elliot Family Papers) and she seems to have reduced his peripatetic habits. That year his *Flora of Dumfriesshire* (Scott Elliot, 1896b) was published in association with the Dumfries and Galloway Natural History and Antiquarian Society which he had joined in 1887. This work is devoid of any description of the species, but it gives notes on localities - including some of the more notable plants from the adjoining counties - and who recorded them, including earlier records. There are also brief ecological notes and 'dates of appearance'. There is a special emphasis on 'insect visitors'. He notes: "catching insect visitors probably occupied more than 9/10^{ths} of the time I have spent on the work". He acknowledges the help of Robert Service who also contributes information on the Hymenoptera of Mid-Solway. His interest in pollinating insects had already been shown by two papers on the fertilisation of the banana and *Strelizia* (Scott Elliot, 1890b), and of South African plants (Scott Elliot, 1891).

In 1896 he also had thoughts of settling down as a botany lecturer. His friend Patrick Geddes - who is best known as the 'father' of Town Planning - was Professor of Botany at Dundee and offered him a post, but as that would have involved very little lecturing he declined (Geddes Papers, 1896). Instead he took up an appointment as lecturer in botany at the then Glasgow & West of Scotland Technical College. From the year he arrived in Glasgow he was also involved with the Marine Station at Millport as a member of the committee in charge of establishing and running the permanent station (Moore & Gibson, 2007).

For a short time he was also Professor of Botany at the Veterinary College, but he soon resigned from this, when there was a big expansion in his main lecturing duties. His title of Professor may therefore seem somewhat honorific. Over 400 students were then attending his classes, with over 250 being instructed in practical botany, especially microscope work. His students were "of both sexes and every condition of life, aged from 16 to 60" – many were training as teachers, and not all had any interest in Botany.

As he found that many of his students did not follow lectures given on "ordinary botanical lines" he changed his approach and avoided technical terms, writing a book "with the view of helping the non-professional lover of nature studies" (Scott Elliot, 1903). He followed this with *A First Course in Practical Botany* (Scott Elliot, 1906) which he said was "the result of five years continuous trials at the Glasgow and West of Scotland Technical College during which a combined course of flower study, experiments, microscope work and explanations had evolved itself ... [through] ... the stimulating effects on the author of enthusiastic students". The 'course' was arranged to last from August to May and the 25 chapters were headed 'Day One' etc.

In his *curriculum vitae* (Scott Elliot, 1901a) he indicates the large expansion in his lecture courses and lists his 'special subjects' as Pollination, Economic and Geographical Botany, Yeast and Systematic Botany. He also lists his areas of botanical exploration, as well as noting that he had been "the most distinguished science student of the year" when in Edinburgh.

He edited an account of the local flora (Scott Elliot, 1901b) for the British Association Meeting in Glasgow, 1901. Prior to this he had carried out considerable work on the College's Herbarium, which consisted chiefly of the collections of two of his predecessors, John Scouler and Roger Hennedy. This work involved authentication of the names by specialists in the various groups. The herbarium now includes his collection of 305 lichens and 59 Bryophytes, and he also added to the collection from other sources, including colleagues in Scotland (Lloyd, 1964). His main personal herbarium, however, is now housed in the Dumfries Museum

While working in Glasgow he first lived in Wilton Mansions, but soon moved out of the City to Kilmacolm and finally to Kilbarchan (Post Office Directories 1897 – 1904). He seems to have felt strangely isolated while in Glasgow, for he complained to his friend Patrick Geddes that "I only have the rather dangerous companionship of demonstrators who do not criticise as much as I would like" (Geddes Papers, 1903).

He left Glasgow in 1903, and it was recorded in the Annual Report of the College that he resigned due to ill health. However, on 12 November 1903 we find him starting on a five months' journey, this time with his wife, through the Andes from Santiago to Buenos Aires (Scott Elliot, 1907a). His book *Chile: Its History and Development* makes only passing references to his own experiences and gives little detailed information on the natural history of Chile, but he is clearly impressed by the country: "No one who has lived in southern Chile would seriously desire to live in Glasgow, London, Liverpool or Manchester".

On his return from South America he settled back in his native Dumfriesshire. He had been elected

President of the Dumfries and Galloway Natural History and Antiquarian Society in 1902 and continued in this position until 1909, after which he became Honorary Vice President. He had also been curator of their herbarium from 1896 until 1909, and maintained his interest in the Society's affairs to the end of his life.

He wrote three of a series of rather strange books entitled *Romance of ...*, published by Seeley & Co. of London. *Romance of Plant Life* (Scott Elliot, 1907b) was followed by *Romance of Savage Life* (Scott Elliot, 1908) and *Romance of Early British Life* (Scott Elliot, 1909). In the latter, in what might almost be autobiographical terms, he describes the people of the Lowlands of Scotland, especially of Dumfriesshire. "He is very tall, lean, broad shouldered, level browed and grey or blue eyed, with brown or fair hair and it is Scotchmen of his type particularly who naturally and inevitably drift out to the borders of the British Empire and to the most dangerous foreign countries ... When an unkind fortune draws him to a close town life he becomes horribly bored, and the result is disastrous".

With the advent of World War I his sense of duty and adventure led to him to be one of the first to volunteer for foreign service, although he was over age. "The bearded professor was transmogrified into a smart, if elderly, subaltern. They soon got his beard off him" (Scott Elliot Family Papers). He served with distinction under fire as a Captain in the King's Own Scottish Borderers in Egypt, and was awarded the Order of the Nile. "In 1917 he was torpedoed off the Italian coast when returning home on leave. He was not permitted to rejoin his regiment because of his age (55) and ill health, but was employed at home as an officer inspecting the Home Defence Corps". Ten years after the war he published the history of the regiment (Scott Elliot, 1928). Unlike many contemporary accounts this is warmly written with reference to the rank and file. It is of interest to note that his nephew, Major General James Scott Elliot, became Colonel of the Regiment in 1954, and he, also, became President of the Dumfries and Galloway Natural History and Antiquarian Society, in 1962.

During his stay in Glasgow he had been closely associated with the Glasgow Natural History Society's antecedents (Ellis, 1936) and maintained this interest long after he left. His last recorded visit was on 13th December 1932 when he read a paper on the blaeberry (*Vaccinium myrtillus*) (Scott Elliot, 1933).

His last years seem to have been dogged by ill health. He and his wife bought a bungalow near Wadhurst, Sussex, where they were near his brother, Lieutenant-Colonel William Scott Elliot, and his family, but they later returned to Dumfries and he died on 20 June 1934 in a nursing home where he had been since the previous August.

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Plant recording at the site of Dixon's Blazes and adjacent area

Peter Macpherson

15 Lubnaig Road, Glasgow G43 2RY

INTRODUCTION

This is a report of the plants growing 'in the wild' on the industrial waste ground between Govanhill and the Gorbals, Glasgow (VC 77). The area comprises parts of NS5863 & 5963. It is bounded by Cathcart Road and Crown Street on the west, to the north by Kidson Street and a play area, on the east there is the curved Lawmoor Street and Lawmoor Road, with the railway to the south (Fig. 1). It formed part of the Little Govan estate, the northern part of which was stated in the 1820s to be a "beautifully secluded place". That part to the south is notable for having been the site of the Dixon's Blazes Industrial Estate.

The mining potential of the area was recognised by William Dixon (1753-1822) who came to Scotland from Northumberland in 1777. He was originally the manager of the colliery, but by 1820 was the sole proprietor. He was also a railway pioneer, laying tracks to convey coal in horse-drawn wagons from Little Govan to the River Clyde. The community of Govanhill originated as a miners' village. The son, William junior (1788-1859) extended the collieries in Govanhill, but also founded the Govan Iron Works with five blast furnaces to the north of Govanhill in 1839. This was the famous 'Dixon's Blazes', so-called because the glare of the furnaces lit up the night sky and could be seen for miles around. The complex was acquired by Colvilles and remained in operation until closure in 1958.

The survey area is 18.75 % of a 1km square. Towards the northern end there is a hillock from which a fox once watched intently as I recorded round the base. This elevated part is L shaped, approximately 100 metres in an east-west direction and 30 metres wide, with the shorter north-south limb 50 metres long and 25 metres wide. It is probable that at one time it was more or less circular, but that material was subsequently extracted. The boundary wall to the east is covered with quite complicated and not unattractive murals.

PLANT RECORDING

Surveys have been done on a number of occasions annually since 2005. Overall less than 20% of the area has plant cover. There are broad areas of tarmac, as well as roads and paths. In between there is much industrial waste. Apart from its northern aspect, the mound has developed a significant shrub cover, particularly of butterfly-bush (*Buddleja davidii*). A total of 224 taxa have been recorded. There are 141 in the native category. Of these the most interesting have been common spotted–orchid (*Dactylorhiza fuchsii*), northern marsh-orchid (*D. purpurella*) and their hybrid *D.* x *venusta*. Other hybrids noted are the eyebrights-*Euphrasia arctica* x *E. nemorosa*, St. John's-worts-perforate (*Hypericum perforatum*) x imperforate (*H. maculatum*) = *H.* x *desetangsii*, docks- curled (*Rumex crispus*) x northern (*R. longifolius*) = *R* .x *propinquus* and the willows- white (*Salix alba*) x crack (*S. fragilis*) and goat (*S. caprea*) x rusty (*S. cinerea*).

Seventeen species of grass have been recorded, the rarest of which in Lanarkshire are:- wall barley (*Hordeum murinum*), flattened meadow-grass (*Poa compressa*) and rat's-tail fescue (*Vulpia myuros*) . Four rushes, three sedges, two horsetails and one fern were noted. Of the 83 aliens, 16 are considered to be on site accidentally. These include wild parsnip (*Pastinaca sativa*) and wild mignonette (*Reseda lutea*). Forty five have been classified as hortal. A number of cotoneaster taxa are regarded as having been bird-sown. Orange-peel clematis (*Clematis tangutica*) and *Genista lydia* are new records for Lanarkshire and were probably dumped. In some cases it is not possible to be sure if a particular plant is hortal or a relic. Instances are Italian alder (*Alnus cordata*) and Firethorn (*Pyracantha coccinea*) which are known to be bird-sown elsewhere in the city. The latter grows alongside and through a boundary fence.

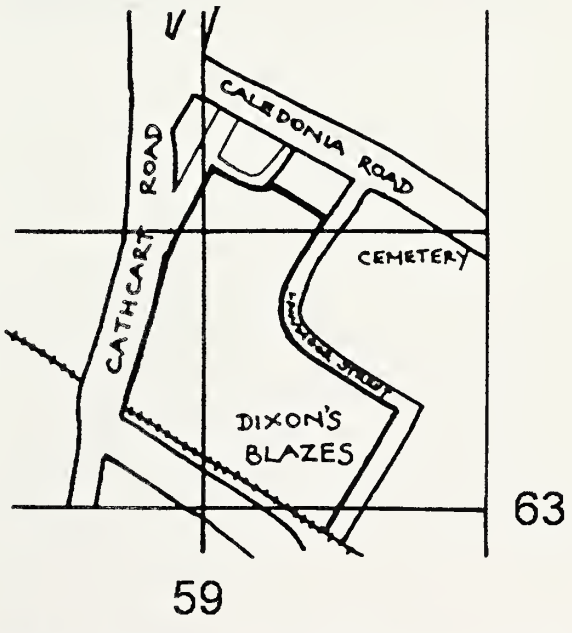

Fig. 1. Boundary of the Dixon's Blazes and adjacent area site. The numbers refer to Ordnance Survey Map 1km squares.

Relics of original planting are the most likely category in 22 cases although they now look very much in the wild. Examples are the quince (*Chaenomeles* x *superb* = *C. japonica* x *C. speciosa*), spreading oleaster (*Elaeagnus umbellata*) and Scottish laburnum (*Laburnum alpinum*). New records for VC 77 in this category are:- *Elaeagnus angustifolia*, *Euonymus fortunei*, *Genista lydia*, flaky juniper (*Juniperus squamata*), willow-leaved pear (*Pyrus salicifolia* 'Pendula') and laurustinus (*Viburnum tinus*) [no name in English for three rarities in this category].The juniper is a prostrate shrub of approximately 10 metres in diameter. I could not decide from the map into which 1km square the juniper should be recorded. Accordingly, I switched on my GPS and strode in towards the centre of the plant. I had taken four paces in when my right lower limb went full length down a hole! Fortunately the plant was over one foot thick by then and springy, so that no trauma was sustained. I have been informed that it has sometimes been used as a man-hole cover!

BRITISH DISTRIBUTION

With regard to national rarities, orange-peel clematis has several scattered occurrences and quince is stated to be very rare. Spreading oleaster has been seen before in Lanarkshire, but there are no other Scottish records and only five surviving records in other British vice-counties; *Elaeagnus angustifolia* is stated to have only unconfirmed British records, those made probably in error for *E. umbellata* (Clement & Foster, 1994). However, the Dixon's Blazes specimen has been so determined by two referees. There is one previous British record for *Euonymus fortunei*, and those for *Genista lydia* and flaky juniper are possibly the first records.

The area will undoubtedly be re-developed in due course, but has been one of great interest in which to record. However, on account of the industrial waste and it being mainly bare ground is in no way a 'Blaze' of colour.

Plant recording is never static, particularly in built-up areas. Since writing the above, excavations have begun in that part of the site through which the M74 extension will traverse.

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The feathered ranunculus *Polymixis lichenea* (Hübner) Lepidoptera: Noctuidae, in the west of Scotland

Neil Gregory[1], Glyn Collis[2] & Dawn Collis[2]

[1] 32 Oldhall Drive, Kilmacolm, Inverclyde, PA13 4RF E-mail: droitwich@btinternet.com
[2] Seasgair, Ascog, Isle of Bute, PA20 9ET E-mail: glyn@butemuseum.org

INTRODUCTION

The feathered ranunculus *Polymixis lichenea* (Hübner) is a fairly large grey-green noctuid moth. The male has feathered antennae which readily distinguish it from males of other British *Polymixis* species and from the small ranunculus *Hecatera dysodea* and grey chi *Antitype chi*. It is one of a small number of species that Leverton (2001) describes as 'unappreciated moths', not particularly noteworthy in Britain as a whole but more significant due to its restricted distribution in Europe where it is found primarily in coastal areas from Denmark in the north to the Iberian peninsula in the south, and also in the western Mediterranean including Italy and the islands of Corsica, Sardinia and Sicily (Karsholt & Razowski, 1996). Skou (1991) uses this species to exemplify a classic 'atlanto-mediterranean' distribution. In Scotland, it can reasonably be described as scarce.

Summarising Waring and Townsend's (2003) distributional notes for Britain, *P.lichenea* is thought to be well distributed along the western coasts of Britain from the Isle of Wight to the Isle of Man and south-west Scotland; more locally on the eastern coasts of England north to Yorkshire; locally on the coasts of Ireland; locally inland as far north as Derbyshire, Cheshire and North Wales. Although *P.lichenea* has a predominantly coastal distribution in Britain, larval food-plants are not confined to coastal habitats. They include biting stonecrop *Sedum acre,* thrift *Armeria maritima*, red valerian *Centranthus rubur,* hounds tongue *Cynoglossum officinale,* plantains *Plantago* spp., speedwell *Veronica* spp., garlic *Allium* spp., and nettles *Urtica* spp. (Heath & Emmett, 1983).

Motivated by recent records from two sites on the Isle of Bute, which is further north than most known locations, we review what is known about the species' occurrence in the west of Scotland. In compiling this review, we consulted standard works on British moths and the Scottish Insect Reference Index (SIRI) held at the National Museum of Scotland. The Hunterian Museum, Glasgow Museums, and the National Museum of Scotland provided information on known specimens of Scottish provenance in their collections. The one such specimen is with Glasgow Museums and is from Vice County 75 (VC75), Ayrshire (see below). It is possible that there are other specimens in non-curated or in-store parts of the museums' collections.

We also consulted Vice County recorders in appropriate areas of the west of Scotland, the Rothamsted Insect Survey (RIS), the Dumfries and Galloway Environmental Resources Centre (DGERC) and other organisations and individuals and who were likely to have or know of records. We extended our consultation to cover areas of Northern Ireland at latitudes comparable to southern Scotland. Where appropriate, some records were checked with the Biological Records Centre, Wallingford (BRC).

RESULTS

Many of the Scottish records we refer to are from light traps, and thus may include adults which have dispersed from elsewhere into the trapping area. One record (Christie, 1987; see below under VC75) is known to be a larva. Among the records, *P. lichenea* is referred to by various former generic names: *Epunda, Eumichtis* and *Polia*. The subspecies *P. lichenea lichenea* is thought to predominate in Britain but none of the records available are given to subspecific level. Among the records, only Jackson (1910) and Gordon (1913) mention a particular colour form; both referred to var. *viridicincta* in relation to their records from the Mull of Galloway (see below under VC74).

VC72 Dumfriesshire

Duncan and Cunningham (1952,1953) mention a 1951 record from Tynron, which is inland within hectad NX89; the former paper makes clear that the record is attributable to Duncan, 2 individuals on 01/09/1951. There is one unpublished record from DGERC: Kirkton, NX972821, 97+ individuals caught during 1997, col R.& B.Mearns, det R.Mearns.

VC73 Kirkcudbrightshire

Two of the Scottish records indicated on Heath and Emmett's map are in Kirkcudbrightshire; NX65 and NX75. These records could not be traced at BRC but they probably refer to records from two traps operated by RIS: Bridge of Dee, NX730590, 22/09/1976, 1 individual; Gatehouse of Fleet, NX602553, 15/09/1974, 1 individual. There is an additional record from a RIS trap at Mabie, NX951707, 18-21/09/1989, 1 individual.

There are also unpublished records from DGERC: Needles Eye, Torrs Heughs, NX887545, 15/09/2003, 6 individuals, col R.& B.Mearns, det R.Mearns; Portling

Bay, NX8854, 1999, 13 individuals, col R.& B.Mearns, det R.Mearns; Rough Island, NX8453, 1994, 1 individual, col, det R.Mearns; Meikle Ross, NX6543, 23/09/2006, 36 individuals, col R.& B.Mearns, det R.Mearns; Cally Woods, NX598547, 1999, 1 individual, col, det P.Norman.

VC74 Wigtownshire

Jackson (1910) found *P.lichenea* among moths sent to her in 1910 from the Mull of Galloway by the lighthouse keeper there. Jackson's record is also mentioned by Gordon (1913), but with the erroneous date of 1909; Gordon adds a 1909 record of his own from the same location. DGERC holds a recent unpublished record from the Mull of Galloway, NX1530, 18-19/09/1998, 5 individuals, col, det anon. Also from DGERC: Castle Feather, Burrow Head, NX447342, 28/09/2003, 16 individuals, col R.&B.Mearns, det R.Mearns; Garheugh Cliffs, NX267503, 25/09/2000, 1 individual, col R.&B.Mearns, det K.Bland (male, genitalia checked).

VC75 Ayrshire

South (1907) mentions records for *P.lichenea* from Renfrew and Ayr. It seems likely that he was referring to records that appeared in a compilation for the Clyde area by Dalgleish (1901). Dalgleish's Ayr record reads 'nr Adamton and Fullerton, Ayrshire (JP Duncan)'. No date is provided but the area between Adamton House, Adamton Mains and Fullerton House is almost all in hectad NS32. It is possible that this record corresponds to a specimen of *P.lichenea* currently in the collection at Glasgow Museums. It was within a collection bequested to the Museum by Col. Robert J. Bennett (b 1843, d 1916), a former treasurer of the Glasgow Natural History Society. The specimen is clearly labelled Ayrshire, but with no date or additional information.

Further south, on the coast, there are records from the RIS trap at Culzean Castle, NS235095, 9 individuals among six different years between 1975 and 1992. Christie (1987) found a larva on garlic on 19/05/86 at Bennane Head, Ballantrae, NX0986; it was successfully reared on garlic, pupating on 31/05/1986 and emerging on 07/09/1986. Inland, there is a record from the RIS trap at Darvel, NS598365, 14/09/1998, 1 individual.

VC76 Renfrewshire

Dalgleish's (1901) Renfrew record reads 'Very rare; one very dark sp. Barrochan Moss, Renfrewshire (1895), (John Dunsmore)'. It is clear that this is the same record as listed by Stewart (1915) and Dunsmore is credited with personal involvement in the preparation the latter list. Unlike Dalgleish, Stewart spells the location Barochan (one 'r') as it appears on present day maps. The location is in hectad NS46.

VC84 West Lothian

The distribution map in Heath and Emmett (1983) indicates a post-1960 record from hectad NT17, west of Edinburgh. This record is believed to derive from a record card held by BRC. The card is headed 'Additions' and records seven species including *P.lichenea*. The location is given as 'Winchburgh, Kirkliston and Dalmeny' and VC84 West Lothian, the date is simply 1976 and the grid reference is 36/1- -7- - (an alternative form of NT17). Interestingly, in the E.C.Pelham-Clinton index in the National Museum of Scotland there is a record of a single individual trapped in his garden at NT099759, Gillerhill (near Winchburgh) on 07/10/1976, and Pelham-Clinton's property extended from NT07 into NT17 (Greg Fitchett, personal communication). Pelham-Clinton would have been careful to provide an accurate grid reference for the location of the moth trap within his garden, but others may not have been aware of the trap's precise location. Therefore, it seems probable that this is the same record as the BRC card and that the record should be from hectad NT07 not NT17. However, in our map (Fig. 1) we have followed Heath and Emmet in plotting it as NT17 to avoid the possibility of a less than careful reader concluding that there are records from two different hectads.

VC98 Argyll (Main)

Christie (1891) reported catching 15 individuals at sugar on 11/09/1891 and more on 13/09/1891 along a road on the shores of Loch Riddon, a location that is almost certainly in hectad NS07.

VC100 Clyde Isles

Not far south of the Loch Riddon location, single individuals of *E.lichenea* have come to light at two sites on the Isle of Bute: on 14/09/2008 in a garden in an open mixed-species woodland environment adjacent to grassland at Ascog, NS104639, and on 24/09/2008 in birch-dominated woodland at Kingarth, NS091552 adjacent to improved grassland, both records col D.&G.Collis, det R.Leverton. On Arran, the RIS trap at Brodick Castle, NS014380, caught 4 individuals among three different years between 1992 and 1999. There is also a recent record in a garden at Dippin in the south of Arran, NS040219, 26/09/2008, 1 individual, col J.Baines, det R.Leverton.

VC101 Kintyre

Skinner (1998) mentions Kintyre as in the range of *P.lichenea*, but we have not been able to trace a more specific location.

Northern Ireland: VCH38 Down and VCH39 Antrim

Skinner (1988) mentioned various localities in Ireland, the most northerly being Down. Records kindly made available by the Northern Ireland branch of Butterfly Conservation confirm that the Newcastle/Castlewellan area of County Down is something of a hotspot for *P.lichenea*; this area is about the same latitude as the Isle of Man. In addition, there are two more northerly records which provide a particularly interesting perspective on the distribution in the west of Scotland. One record is from Copeland Island Bird Observatory, which is on Lighthouse Island at the east end of Belfast Lough, J597859, 24/09/2004, 1 individual, col, det

K.Leonard. This site is about the same latitude as the Mull of Galloway and Burrows Point in Dumfries & Galloway. Further north, at the west end of Rathlin Island, D092517, 25/08/2001, 1 individual, col, det M.Hughes. Rathlin Island is about the same latitude as Culzean Castle in Ayrshire, but much more exposed to Atlantic weather.

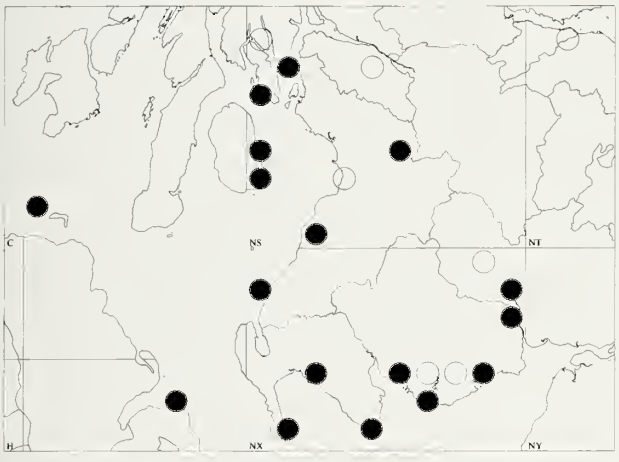

Fig. 1. The geographical distribution of records of the feathered ranunculus *Polymixis lichenea* mentioned in the text. Open circles represent 10km squares with records prior to 1980, filled circles represent later records. Note that the true location of the record in hectad NT17 might be NT07 (see text). Map produced by MapMate® using Digital Map Data © Bartholomew 2008. Data Overlay Copyright © Glasgow Natural History Society and the authors.

DISCUSSION

To summarise the distribution of *P.lichenea* in the west of Scotland (Fig. 1), there is a wide scattering of records across Dumfries & Galloway (VCs 72, 73 and 74) but it is unclear whether the relatively high density of records in this area truly reflects a stronghold of the species or simply more recording activity. The most recent record that we are aware of from that area is 2006. To date, there are many fewer sites yielding recent records in Ayrshire, VC75, one of which is a century-old record. There are also single century-old records in each of Renfrew VC76 and Argyll (Main) VC98. In the Clyde Isles VC100, Arran has yielded recent records at two sites, and the species has appeared at two sites in Bute in only the second year of light trapping there.

Fig. 2 summarises the distribution of dates of capture of adults across the annual cycle for the 31 instances where we have full dates. Multiple individuals taken on the same date at the same site are regarded as a single data point. The earliest capture was on 21st August, and the latest on 7th October. The median date was 19th September. Data from two RIS traps demonstrate that, over several years, individual sites can have a wide range of capture dates: Brodick Castle 21st August to 8th October; Culzean Castle 28th August to 7th October.

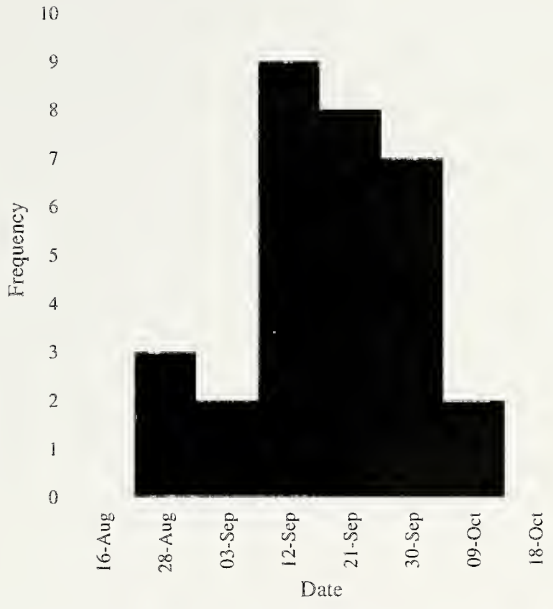

Fig. 2. Seasonal distribution of Scottish records of the feathered ranunculus *Polymixis lichenea*. Each bar represents a 9 day interval.

What can be said about the scarcity of *P.lichenea* in the west of Scotland? The relatively systematic nature of the RIS trapping programme provides an opportunity to examine the frequency of records with a firmer basis than is typically possible. The period when the various traps were in operation is as follows: Bridge of Dee 1975 to 1977;Gatehouse of Fleet 1974 to 1980; Mabie 1985 to 1992; Culzean Castle 1976 to present; Darvel 1996 to 1998; Brodick Castle 1984 to present. To avoid bias, an additional trap in the area should also be considered: Auchincruive 1968 to present. Auchincruive provided no records of *P.lichenea*, but to omit it from consideration could inflate estimates of frequency. On the other hand this site is somewhat atypical as catches are relatively small in number and the surrounding area is dominated by intensive grassland. Using data from the seven RIS traps up to and including 2006 (at the time of writing subsequent data is incomplete) we calculate an estimate of 17 individuals in 114 trap-years or 1 individual in every 6.7 trap-years (about 1 individual in 4.4 trap-years if we omit Auchincruive). These estimates should be lower than trap rates where site selection was optimised for *P.lichenea*. It should also be noted that RIS traps use 200 watt tungsten bulbs and so catch smaller numbers of moths in general than traps with mercury vapour bulbs.

ACKNOWLEDGEMENTS

This account could not have been written without many people who have helped us in our search for information, including moth recorders who have generously shared their records with us. We owe a debt of gratitude to: Helen Roy, Peter Brown and Val Burton of BRC; Jeff Waddell & Greg Fitchett in the Lothians; Mark Pollitt of the Dumfries and Galloway

Environmental Resources Centre and to Barbara & Richard Mearns, Peter Norman and Keith Naylor who provided and/or collated the DGERC records; Ian Woiwod of Rothamsted Research; Ted Ralston of the Northern Ireland branch of Butterfly Conservation and local recorders Mr K.Leonard & Mr M.Hughes; Judith Baines and Tom Prescott for details of the south Arran record; Jeanne Robinson for details of the specimen in Glasgow Museums; Richard Lyszkowski for the listing from SIRI and for providing, with Keith Bland, information on the collection in the National Museum of Scotland; Geoff Hancock for information on the collection in the Hunterian Museum; Joanne Turner of Dumfries Museum and Richard Weddle of Glasgow Museums for aiding access to published literature; Roy Leverton for many kinds of advice and encouragement; two anonymous referees whose comments were extremely helpful in improving the manuscript.

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SHORT NOTES

Sorbus Promiscuousness

R.K.S. Gray

"Langdale", 6 Prince Albert Road, Glasgow G12 9JX
E-mail: rksgray@gmail.com

Recent press publicity has drawn attention to the existence of a new species of *Sorbus* found in Glen Catacol in the northwest of Arran and so it might be worthwhile making a brief comparison between what is happening in Arran and the West End of Glasgow, unlikely though that may appear. Dickson (1991) lists two hybrids amongst various *Sorbus* species discovered in Glasgow's West End during the compilation of data in the 1980's for the 'Changing Flora of Glasgow' project. These are: *S.* x *thuringiaca* [between rowan (*S. aucuparia*) and the common whitebeam (*S. aria*)] and *S.* x *pinnatifida* [between rowan and the Swedish whitebeam (*S. intermedia*)]. In connection with the latter it is written, "In the Glasgow area only one obviously self-sown tree was known ..... in Novar Lane, Hyndland where it was discovered by June McKay. It may have been the only such wild hybrid in Scotland. ..... Nearby grew the putative parents. ..... The leaves have two or three basal leaflets, then a lobed, short, somewhat triangular apex.". About June, 2006 Mogens Hansen lent me a copy of a recent paper from *Watsonia* about a new endemic, *Sorbus pseudomeinichii*, from Arran. This plant is the hybrid about which there has been so much media publicity this year (2007). Phil Lusby, in the herbarium of RBGE, found an unfamiliar *Sorbus* collected in Arran by D. McVean in 1949 and thought it likely to be a cross between the Arran service tree (*S. pseudofennica*) and rowan. Lusby found the hybrid in Glen Catacol and subsequent molecular analysis confirmed his idea. So armed with the paper from *Watsonia* I travelled to the northwest of Arran in autumn 2006. I have to say that the thrill of finding this plant in its native habitat was for me akin to that of finding a new species (something I've never done). Not only that but the identity of the *Sorbus* I'd found was confirmed by an aluminium tag attached to the tree (actually a number of stems sprouting from a fallen main trunk), which was growing in a barely accessible location near the foot of a waterfall. But what of the Glasgow connection? The leaves of this Arran tree were not identical to those in Novar Lane, having 4–5 pairs of leaflets compared to 2-3 in the Glasgow specimen. Rowan has a diploid (2n) chromosome number of 34; both Swedish whitebeam [Glasgow] and *S. pseudofennica* [Arran] have 4n = 68. So the *S.* x *pinnatifida* found by June Mackay and *S. x pseudomeinichii*, the new microspecies from Arran, both have triploid (3n) chromosome numbers of 51 (17 from one parent and 34 from the other), a rare state of affairs. Each of these triploids has rowan as one parent.

The other parents are *S. intermedia* and *S. pseudofennica* respectively. Whereas *S. pseudofennica* has rowan in its immediate parentage, *S. intermedia* has the wild service tree (*S. torminalis*). [Each has the Arran whitebeam (*S. arranensis*) as the other parent (McAllister, 1986; 2005).] Rowan and the wild service tree both have 34 chromosomes but the former has pinnate leaves and the latter has lobed leaves. Having the same chromosome number does not make two species identical. So the extra leaflets (pinnae) in *S. pseudomeinichii* compared with *S. pinnatifida* are explained by the presence of rowan instead of the wild service tree in the 'grandparentage' of the Arran tree. Sadly June's discovery disappeared (tidied up?) some year's ago but the occurrence of such unusual hybrids exemplifies the relative ease with which interspecific (even intergeneric according to some classifications) hybrids can occur within the Rosaceae. (see previous papers in *The Glasgow Naturalist* about *Cotoneaster* hybrids (Macpherson & Lindsay, 2002)

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In addition to the people mentioned above thanks are also due to Ian McCallum for providing articles from *The Arran Naturalist*.

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First record of the Opilione *Dicranopalpus ramosus* (Simon, 1909) in Glasgow

Mike Rutherford

Kelvingrove Art Gallery & Museum, Argyle Street, Glasgow, G3 8AG
E-mail: mike.rutherford@csglasgow.org

In September 2007 an unusual harvestman was found on the garage wall of MR in Mosspark, Glasgow. It was soon identified as a female *Dicranopalpus ramosus* (Simon, 1909); identification is fairly easy due to the forked pedipalps and unusual resting posture of having its long legs stretched out perpendicular to its body. No further specimens were found over the subsequent weeks. There had been no recent new plantings or new fixtures in the garden so there was no obvious origin.

It has been said that it prefers woody plants and damp areas; the adults are generally active in autumn and into early winter. In many areas where it has been observed further south it has been in quite high numbers (Hillyard, 1999).

D. ramosus is a southern species that has been slowly making its way north over the last few decades. First described from Morocco in 1909 as *Dicranochirus ramosus* (Hillyard, 1999) the species was first recorded in the UK in Bournemouth in 1957 (Sankey & Savory, 1974) and through the 1960s was only found on the south coast. In the 1970s and 1980s it spread over the south of England reaching as far north as Leicester by 1989. It reached south-east Ireland in 1994 and spread to north Wales and north-west England throughout the 1990s and into the 2000s (NBN Gateway, 2008). The first Scottish record was from Edinburgh in 2000 (Hillyard, 2000) and now it has been found in Glasgow in 2007.

The specimen is in Glasgow Museum collections numbered Z.2007.67.

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Rapid expansion of a stand of common club-rush at the Balmaha Marshes, Loch Lomond

John Mitchell

22 Muirpark Way, Drymen, by Glasgow G63 0DX

The first published mention of flowering plants of the water's edge at Balmaha (VC.86) in the south-east corner of Loch Lomond followed an excursion by the Natural History Society of Glasgow on 8 July 1893 (Anon, 1897). More than a century later, the district has lost none of its appeal to field botanists, in particular the Balmaha Marshes (NS 425903) – a loch-side wet meadow which is in the process of being fragmented into a patchwork of shallow lagoons and small islands resulting from wave erosion during winter storms.

Fig. 1. Two decades of expansion by a stand of common club-rush at the Balmaha Marshes, Loch Lomond (Photographs: John Mitchell). **(top)** 24 July 1987 **(bottom)** 23 July 2007.

Over the years the Balmaha Marshes have produced an impressive list of nationally rare and locally uncommon species, including small water-pepper *Persicaria minus*, Loch Lomond dock *Rumex aquaticus*, eight-stamened waterwort *Elatine hydropiper*, awlwort *Subularia aquatica*, tufted

loosestrife *Lysimachia thyrsiflora,* narrow-fruited water-starwort *Callitriche palustris,* lesser water-plantain *Baldellia ranunculoides,* thread rush *Juncus filiformis* and needle spike-rush *Eleocharis acicularis.* Today the rich diversity of this wetland community is under threat, not only from being overtaken by non-indigenous plant invaders (Mitchell, 2008), but also from a rapid colonisation by the native common club-rush *Schoenoplectus lacustris,* in the last 20 years the species covering more than half of the marshes' open water (Fig. 1a & b).

At least two factors would appear to be involved in the club-rush's recent vigorous performance. In the past cattle played a role in keeping the spread of the club-rush in check, both by grazing the young growth and trampling the plant's exposed rhizomes when the loch level dropped during the summer months. Since 1972 however, when Loch Lomond was impounded as a major water supply for Central Scotland, the raised loch level has limited cattle access to the site. Perhaps of more importance is the club-rush's response to the steady increase in nutrient enrichment known to be occurring in Loch Lomond's southern waters, the problem of chemical imbalance caused by sewage discharge and agricultural fertilisers finding their way into the waterways of the surrounding catchment area (Scottish Environment Protection Agency, 2008).

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New records for the red mason bee *Osmia rufa* (Hymenoptera: Apidae) in the west of Scotland.

Jeanne Robinson

Natural History Department, Glasgow Museums, Kelvingrove Museum and Gallery, Argyle Street, Glasgow, G8 3AG.
E-mail: jeanne.robinson@csglasgow.org

According to the latest British atlas, the red mason bee *Osmia rufa* is widely distributed and common throughout much of mainland Britain. Whilst it is found as far north as Fife; it is generally regarded as rare in Scotland and parts of northern England (Else & Roberts, 1998). The few publicly available Scottish records are for the east of the country. It is included in the Scottish Biodiversity List because it is categorised as present in 5 or fewer 10km squares in Scotland (www.biodiversityscotland.gov.uk, 2008); the additional records, detailed below, call its inclusion on this list into question.

The red mason bees are thought to have been active in the west of Scotland since at least spring 2006. A local beekeeper phoned Glasgow Museums for advice on bees nesting in the mortar of a sandstone house in the city. This is a classic nesting site for these kinds of bee, and the source of their common name. His description matched that of red mason bees, but no samples were submitted. One nesting site was in the south west of the city, in Dumbreck (NS5663). This site had a large number of bees nesting along the gable and south wall of the house; a second was in the north east, in Springboig (NS6564) on a south-facing gable (Charles Irwin pers. comm.).

Its presence in the west of Scotland was confirmed following an enquiry from Keith Futter of the Glasgow Naturalist History Society on 7 April 2007; who submitted a number of excellent digital images to Glasgow Museums for identification (see Fig. 1. for an example). The characteristic dense ginger hairs on the body and the horn-like projections on the face of the female were clearly visible in one photograph (www.bwars.com). The bees were living in the mortar of his house in Dumbarton (NS386752). No other nests were found in the area until the next spring. At the beginning of May 2008, images of a solitary bees' nest were submitted by Countryside Rangers at Pollok Country Park for identification. These bees were nesting in a south-facing wall and on a wooden post in the stable yard of Pollok Country Park, Glasgow (NS550615). The mud that they collect to form their nest structures was clearly visible on the wooden post. Red mason bees are known to exploit holes in dead wood as well as masonry to rear their young, and they are one of only two British *Osmia* species to use mud in their nest construction (Else & Roberts, 1998). A male was subsequently collected on 7 May 2008 and the identification confirmed. This specimen has been retained for Glasgow Museums' collection (registered number: Z.2008.26).

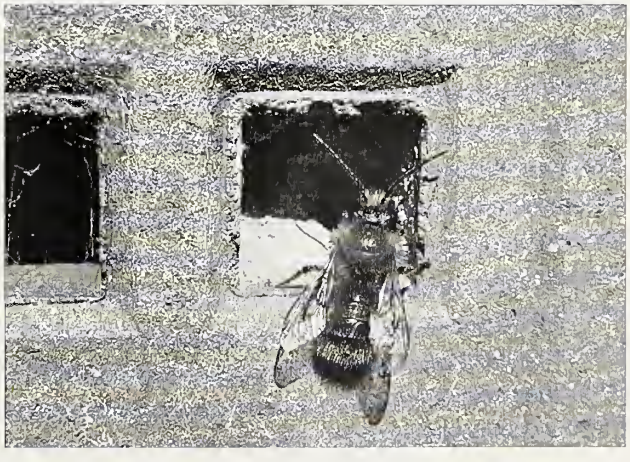

Fig. 1. *Osmia rufa* in Dumbarton, 2007 courtesy of Susan Futter.

It is likely that red mason bees are currently quite widespread in central Scotland. They are now confirmed to be present between Dumbarton in the west , West Lothian in the east, and north up to Kinnaird, Angus (National Biodiversity Network 2008). There are no records yet from Ayrshire, Dumfries and Galloway or the Borders (Murdo Macdonald pers. comm.). Given that the bees are found to the north and south of these counties, and the widespread availability of suitable habitat it is likely that the current distribution reflects a lack of recorders rather than a disrupted distribution. Red mason bees have been growing in popularity as commercial pollinators of gardens and orchards, so any range extension could be assisted by man (Paxton, 2005).

This would help explain a discontinuous distribution, if one does exist. By offering simple nests one can encourage these bees to occupy an allotment or garden. The bees will offer valuable pollination services once established. Nests are available commercially, but it is easy and relatively cheap to make your own. The bees prefer holes in wood or hollow reed stems (i.e. *Phragmites*) to nest in (Wilkaniec & Giejdasz, 2003). The author would be interested to hear of further suspected sightings of red mason bees in Scotland, particularly in the west.

ACKNOWLEDGEMENTS

With thanks to Murdo Macdonald for his consultation, the late Keith Futter for his enquiry and his wife Susan for her superb photographs, Lindsay Gemmell for a pristine specimen and Charles Irwin for his excellent memory.

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NBN (National Biodiversity Network) Gateway – Grid map of records on the Gateway for Red Mason Bee (*Osmia (Osmia) rufa*) available at http://data.nbn.org.uk/gridMap/gridMap.jsp?allDs=1&srchSpKey=NHMSYS0000876504 (Accessed 17th November 2008) The Scottish Biodiversity List - Species & Habitat Detail – *Osmia rufa* available http://www.biodiversityscotland.gov.uk/sbl_detail.php?id=39&type=2&navID=9&pageref=sbl_detail&tvk=NBNSYS0000009762 (Accessed 17th November 2008)

Plants in relation to ox-bows north of the River Kelvin

P. Macpherson[1] & E.L.S. Lindsay[2]

[1]15 Lubnaig Road, Glasgow G43 2RY
[2]18 Monreith Road, Glasgow G43 2NY

To the west of the outskirts of Kirkintilloch the River Kelvin forms the boundary between the vice-counties 77 & 86 (Lanarkshire and Stirlingshire). Within one kilometre of the town there are two ox-bow pools (NS6373) to the north of the river, representing the original channel, before it became straightened out. For recording purposes, the area remains within Lanarkshire. The most northerly arc is within 165 metres of the most northerly part of VC 77 (Fig. 1). A river bend returning almost upon itself is referred to as an ox-bow (an ox-bow being a collar for a yoked ox). An ox-bow pool or lake is formed when the neck is pierced and the bend cut off.

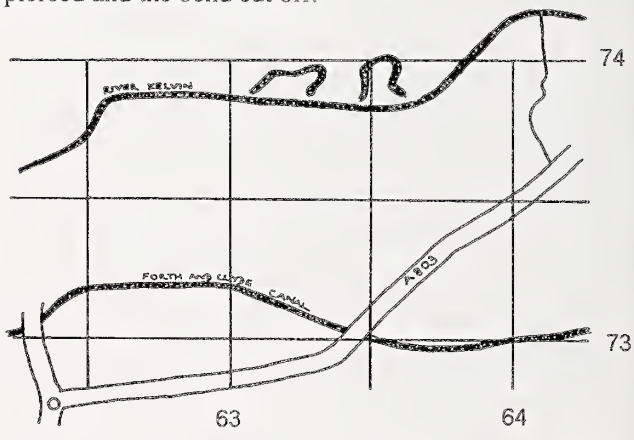

Fig. 1. Ox-bows north of the present course of the River Kelvin (NS6373). Numbers refer to Ordnance Survey Map 1km squares.

In June 2008 we conducted a botanical survey, based on the Lanarkshire half of the pools and the adjacent banks. A total of 105 taxa was recorded. In the easterly pool we found the dominant vegetation to be water horsetail (*Equisetum fluviatile*), while reed canary-grass (*Phalaris arundinacea*) was prolific in that to the west. In general, there is little open water. Valerian (*Valeriana officinalis*) was common on the banks of the pools. Of those in, or at the water's edge, the two species which we found of most interest were greater spearwort (*Ranunculus lingua*) and tufted loosestrife (*Lysimachia thyrsiflora*). Other notables were bogbean (*Menyanthes trifoliata*), mare's-tail (*Hippuris vulgaris*), water plantain (*Alisma plantago-aquatica*), wood clubrush (*Scirpus sylvaticus*) and yellow water-lily (*Nuphar lutea*). Oval sedge (*Carex ovalis*) was on a bank and water (*C. aquatilis*) and bottle (*C. rostrata*) sedges were in the water. Rye-grass (*Lolium perenne*) was dominant in the ground within the arc of the

eastern pool with common sorrel (*Rumex acetosa*) giving an overall brownish colour within the other. We recorded also in those small parts of the northern bank of the River Kelvin which are in Lanarkshire.

In contrast to recording elsewhere in the Greater Glasgow area, there were only three aliens. At the end of the easterly ox-bow we saw the accidental pineappleweed (*Matricaria discoidea*) and on the river bank were the hortals dame's- violet (*Hesperis matronalis*) and sycamore (*Acer pseudoplatanus*).

The girdled snail, *Hygromia cinctella* (Gastropoda: Pulmonata: Hygromiidae): first Scottish record

Richard Weddle

89 Novar Drive, Glasgow G12 9SS
E-mail: richard.weddle@tiscali.co.uk

On September 21st 2008 I collected a few small snails from leaves of Japanese Knotweed (*Fallopia japonica* (Houtt.) Ronse Decr.) in Hayburn Lane, Partickhill, Glasgow (NS553671).

Among them was a specimen of *Hygromia (Hygromia) cinctella* (Draparnaud, 1801), the 'girdled snail', a southern European species first recorded in the UK in Devon in the 1950s (www.conchsoc.org/projects/hyg-cinct.php) and which has not until now been recorded north of Leeds (Adrian Norris, pers. comm.). It may be that it had migrated from a nearby garden, having been introduced with new plant material.

A recent survey by the National Museum of Wales confirms that the snail is well-established there (www.museumwales.ac.uk/scan/). It is has also been recorded in many locations across southern England (data.nbn.org.uk), and most probably occurs, as yet unnoticed, elsewhere.

There is some interest in *Hygromia cinctella* as a snail of warm climates, and therefore a possible indicator of climate change. However more study would be required to establish the viability of the species in Glasgow; I will be looking out for it next spring to see whether it has survived the winter.

The Partickhill end of Hayburn Lane is notable for an abundance of snails. These are mainly *Helix aspersa* Mueller (*Cornu aspersum*), though there are also *Cepaea* and *Trochulus* (formerly *Trichia*) species. The lane as a whole is a valuable wildlife corridor alongside a railway line and its former branch leading to the original site of Hyndland Station (personal observations).

I am grateful to Mike Rutherford at Glasgow Museums for identifying the specimen, and to the Conchological Society of Great Britain and Ireland for information about its British distribution.

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OBITUARY

Keith Futter (1962-2008)

Keith Futter was born on 19th January 1962, the eldest of two children, and grew up at Fulbourn, on the outskirts of Cambridge. He failed his 11-plus exams at school, but went on to pass his A levels and attended the University of Sheffield from 1980 to 1983, where he obtained a B.Sc (Hons) Zoology. This was followed by a Ph.D at the University of Nottingham from1983 to1989 on '*Age and sex differences in the foraging behaviour of Lapwings, Vanellus vanellus in mixed species flocks*'. While completing his studies, he also worked as a biological surveyor as part of a small team completing a detailed habitat survey of the City of Derby for the Derbyshire Wildlife Trust during 1987 and 1988. He subsequently published *The Flora of Derby* with Peter Raynes (Futter & Raynes, 1989).

Fig. 1. Keith Futter, on holiday in Norfolk, summer 2007. Photograph: Susan Futter.

In 1990 he moved to Scotland to lead the Dumbarton Habitat Survey Team and organised a comprehensive habitat survey of Dumbarton District for the Scottish Wildlife Trust. From 1991 to 1994 he worked for Scottish Natural Heritage, compiling Nature Conservation Strategies for seven environmental improvement projects associated with Strathclyde Regional Council's 'Greening the Glasgow Conurbation Initiative'. He moved to Fife for a year in 1995 to work as a project Officer for Dunfermline District Council, co-ordinating the compilation of a management plan, the designation and launch of the Torry Bay Loeal Nature Reserve. In 1997 he completed a course on the internet and designing basic websites, and in August 1997 married Susan Ebdon, a biological surveyor whom he had first met when they worked together on the Dumbarton habitat survey. Around this time he helped Susan, together with Geoff Hancock, undertake a survey of the Odonata of the Forth and Clyde Canal. Shortly afterwards both he and Susan began working for Tesco Personal Finance, initially on a temporary basis, but the posts then became permanent.

Keith had a wide range of interests. A keen gardener, he was a member of the Scottish Rock Garden Club and the British Cactus and Succulent Society. He grew many native plants from seed he collected locally to be used as part of conservation projects. Some of these plants are now growing at Brucehill Cliffs, Dumbarton; Mugdock Country Park, and at a butterfly garden in West Kilbride, attracting butterflies and other insects. He was always keen to promote the importance and benefits of ragwort for wildlife, in places where it posed no danger to horses and would argue strongly with those people who insisted it should always be eradicated and exterminated entirely, regardless of its location.

He was a talented artist and a good photographer. His line drawings appeared on the covers of several issues of Butterfly Conservation's local branch newsletter, *On the Spot* (Fig. 2), his photographs were used in various promotional leaflets and booklets.

Fig. 2. Scotch argus butterflies. Line drawing by Keith Futter, 1994.

Many people would be surprised to know that Keith was also interested in steam locomotives and particularly liked aircraft, often going to air shows. His mother used to deal in antiques on a small scale, collecting and selling silver, ceramics etc. This may have influenced Keith, as he too was a keen collector – he collected minerals, shells and many other items of natural history interest.

Keith was a prominent member of the Helensburgh Green Belt Group. In the early 1990s he recognised the importance of Blackhill Mire on the outskirts of the town for Lepidoptera. He showed that it was probably the best site in the Greater Glasgow area for the Green Hairstreak butterfly and made major efforts to protect the site from proposed developments by Helensburgh Golf Club.

He only joined the Glasgow Natural History Society (GNHS) in 2005, but was a fairly regular contributor to the Glasgow Naturalist, writing short notes, often with his wife Susan, on entomological and botanical subjects (Futter & Futter, 1998a, b, 2000, 2001; Futter, 2001) and contributed numerous records to the annual Scottish Insect records reports (Hancock, 2000, 2001, 2002). He published articles in Urban Wildlife News (Futter, 1992a, 1992b), various items in Butterfly Conservation's local branch newsletter, (e.g. Futter, 1993) and also produced many unpublished reports detailing district-wide habitat surveys (Futter, 1990, 1992, 1994).

An active member of Butterfly Conservation, he was vice-chairman and Conservation officer of the Glasgow & South West Scotland Branch from 1993 -1995, and the branch's Regional Action Plan Officer from 2000.

He was a very keen biological recorder. He sent over 1,500 butterfly records to Butterfly Conservation between 1992 and 2007. He ran a moth trap and recorded all the wildlife in and around his Dumbarton garden, producing lots of records, which he passed onto the Glasgow Museums Biological Records Centre.

He was the driving force behind the *Butterflies of South West Scotland,* (Futter *et al.*, 2006). He brought all the contributors together, organised meetings, and managed to get funding from a wide variety of sources. Not only did he write well over half of the text, he also designed the layout and liaised with the publisher. Without him the book probably wouldn't have happened. Together with Richard Sutcliffe, he gave a presentation on the book to the GNHS on 14 November 2006.

In 2002 Keith was diagnosed with melanoma. He went through several operations and had periods of remission, but unfortunately the cancer returned in 2007. Even in the last few months of his life, he was determined to make sure that some of the issues he was passionate about would continue after he was gone.

He was keen that the small blue should be considered for re-introduction to the Ayrshire coast as part of the Ayrshire Local Biodiversity Action Plan. He was also determined to get more recognition for his local wildlife site, Brucehill Cliffs, Dumbarton. As late as Deeember 2007, Keith was having discussions with the Dunbartonshire Biodiversity Officer about this and other local sites. Brucehill Cliffs is likely to be designated as West Dumbarton's first Local Nature Reserve in the near future.

Keith died on 2 Feb 2008. An all-round naturalist, his expertise and wide knowledge will be greatly missed by the many organisations he was involved with, and Scottish natural history has lost a major supporter.

My sincere thanks to Susan Futter for providing information about Keith's early life.

Richard Sutcliffe

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The Glasgow Naturalist (2009) Volume 25, Part 2, 73-79

BOOK REVIEWS

Arctic Fox. Life at the Top of the World

Gary Hamilton. Photographs by Norbert Rosing.

A & C Black Publishers Limited, London. 2008. 232 pages, hardback, colour photographs. ISBN: 978-1-408-10698-3, £16.99.

Gary Hamilton gives an excellent account of the evolution and ecology of Arctic foxes. It is written in a journalistic style by referring to a wide range of published work and from interviews with field biologists who have studied this species over many years. The book is beautifully illustrated with colour photographs of Arctic foxes, habitats and many other Arctic species by Norbert Rosing. I would recommend this book to anyone who is fascinated by the natural history of the polar regions.

The Arctic fox is one of fourteen species of foxes found throughout the World, it is approximately half the size of a red fox, and is superbly adapted to cold conditions where food is scarce. Linnaeus named the Arctic fox *Alopex lagopus*: the 'hare footed fox', because of its hair covered foot-pad also found in hares. The ability of Arctic foxes to survive in one of the coldest places on Earth was demonstrated by Scholander and Irving in the 1950s who experimentally showed that the Arctic fox only starts to increase its metabolic heat production when air temperature falls below -40 °C. Amazingly at -80 °C an Arctic fox exhibits no drop in body temperature!

This book is filled with clear and accessible scientific explanations alongside accounts of interactions between Arctic foxes and humans. A particular relevant account is of a ship searching for Sir John Franklin and his crew that was trapped in the ice between Greenland and Ellesmere Island in 1853. The ship became over-run with stowaway rats and in a final desperate attempt to control the rats, an Arctic fox was released below decks to control them. The fox dutifully got to work killing them, as only a highly opportunistic predator could. Arctic foxes can survive in this region only because they are opportunists and range over considerable distances to find food. Their reproductive success is dependent on lemming populations but Arctic foxes will switch to other diets when prey are scarce and will feed on seabirds, carrion from polar bear kills or even from discarded food from humans. Arctic foxes also have the remarkable ability to cache large numbers of bird eggs to tide them through periods of food shortage.

The final section of this book provides a very good overview of the history of hunting in the Arctic and the commercial trapping of Arctic foxes for the fur trade from 1870 onwards. Today Arctic foxes have recovered well from persecution, with the exception of Scandinavian populations where it is estimated that as few as 150 individuals are confined to high altitude areas. This could be due to falling lemming populations and possible displacement by the larger red fox that is extending its range into Arctic fox habitats. The extent to which climate change may influence the Arctic fox across circumpolar environments is uncertain but it is known that previous interglacials have reduced their range.

Dominic McCafferty

Wolf – *Legend, Enemy, Icon*

R. Grambo and D. Cox

A & C Black Publishers Limited, London. 2008. 176 pages, paperback, colour photographs. ISBN: 978 14081 06327, £14.99.

"Wolf – *Legend, Enemy, Icon*" Is a superb book dealing in depth with mankind's long-standing fascination with wolves. Rebecca Grambo writes of the transition of wolves, from a symbol of beauty, power and creation to a nuisance predator hunted in many regions to extinction, with great understanding and compassion. The accompanying photography shows Daniel Cox to be a highly accomplished wildlife photographer, with his pictures capturing the character of wolves – not just as vicious killers, but also as sociable, curious and even playful animals.

One could be mistaken for thinking this is a typical "coffee table book." And while this would make a fantastic addition to anyone's coffee table, it would seem a shame to keep such an informative book merely for show. The wolf has had a fascinating relationship with man, and Grambo fills this text with interesting 'tit-bits' of information throughout. Even those with a keen interest in wild canines are unlikely to know that Hitler was responsible for making Germany the first nation to make wolves a protected species in the mid 1930s – despite wolves having been extinct from Germany since the previous century! The history of the turbid relationship between wolf and man goes back further still, with wolves playing important roles in Roman and Norse mythology.

Amongst the history of man's fascination with wolves, Grambo also deals with the science of the species, writing concisely and thus keeping this book as an accessible text to others than professional ecologists. This is highly important at a time when re-introduction of wolves across much of Europe, and possibly Scotland, is becoming an active area of debate. The problems concerning previous re-introductions, for example Yellowstone National Park, are highlighted along within potential problems facing any reintroduction. However not all is doom and gloom;

the overall success of previous reintroductions is the main focus, praising the use of scientific knowledge, rather than sentimentality, as a basis for reintroducing wolves in parts of their previous range.

For anyone with an interest in wildlife, this book is a must read. The photography, paired with stories, history, and current ecological issues provide an extremely enjoyable read. For those with a specific interest in wild canines, or even specifically wolves, there is no doubt that reading "Wolf – *Legend, Enemy, Icon*" will prove enjoyable, but on top of that it provides an opportunity to get to grips with the background ecology and history of this fascinating animal.

Angus Cameron

Birds of Prey
Benny Génsbøl

Harper Collins Publishers, London, 2008, 414 pages, hardback, numerous illustrations, colour photographs, drawings and maps. ISBN 9 78 0 00 724814 8, £30.

This is an attractive book, outside and within, a fine example of Scandinavian design. The contents maintain the standard - a remarkable display of the many raptors of Europe, their lives and adaptations to their ways of life. Well written, it uses both the critical knowledge of the author and the support of fellow expert advisers in 33 countries of Europe. The mainly photographic illustrations by Biarne Bertel are not only good to look at but each displays some relevant aspect of behaviour. Distribution maps might benefit from greater contrast or additional colours.

The contents show both the practical experience and contemporary thoughts of the author, well presented and easy to read in this English translation. Two hundred and twenty six pages of introduction discuss adaptations to environment, food, hawking methods, migration, breeding biology, threats from pollution, habitat changes, other dangers, shooting, persecution, and support by captive breeding. Species descriptions follow for over 200 pages followed by sections on identification (at over 800g - just a bit heavy for field use), bibliography, sources of population figures, names in 6 languages and index.

Norman R Grist

A History of Ornithology (The New Naturalist Series No. 104)
Peter Bircham

Collins, London. 2007. 482 pages, many colour plates. ISBN 978-0007199693 (hardback), £45.00. ISBN 978 0007199709 (softback), £25.

A new book in the New Naturalist series is always eagerly anticipated. The general title of this book would cover a vast canvas but its contents specifically refer to 'a complete history of bird watching in Britain'. It begins with ornithological comment from before the 16th century, through all the exponents and artists involved in early bird study, migration and behaviour. It finishes with present day taxonomy and DNA studies. The book endeavours to set into context and chronology the progress and important characters in British ornithology since the first writings began. The new photos of birds are of top quality, but many of the illustrations are portraits of the early ornithologists such as Pennant, Dresser, MacGillivray, Alfred Newton and so on. Modern photos of James Fisher, Niko Tinbergen and a host of other recent ornithologists are also depicted, acknowledging their part in modern ornithological research and thinking. Some familiar artistic bird illustrations, from books many of us still have on our shelves at home, grace the pages. Thorburn's wonderful illustrations are scattered throughout. The final part of the book delves into the ornithological fraudsters such as Bristow and Col. Meinertzhagen who faked new species onto the British List to exalt their own profile as ornithologists. It is all fascinating stuff and well worth the read.

I have a few gripes; Fig 35 is not a Great Northern Diver but a Black-throated Diver, as is noted on the sketch. There is also a picture depicting a 'Mrs Meiklejohn' - Fig 143 - which was certainly not the implied wife of Maury Meiklejohn, a confirmed bachelor. Scottish ornithologists in general seem to have been largely overlooked. Jenner's Cuckoo studies for example are illustrated by the excellently observed sketches of Jemima Blackburn (Mrs Hugh Blackburn) but she is given no credit. Alexander Wilson, the Paisley born ornithologist who went on to become known as the 'father of American ornithology', is skimmed over in favour of Audubon, who frequently cribbed paintings by Wilson for his own *Birds of America*. The prolific David Bannerman's dozen or more tomes on the Birds of the British Isles don't even rate a mention. George Waterston and R M Lockley whose inspirational fieldwork and writings could fill a book on their own are confined to a few brief sentences.

Having said that, no book such as this can include everything and it does not really detract from what is an otherwise excellent read. I will certainly buy it and have no hesitation in recommending it to all.

Bernard Zonfrillo

Penguins of the World

Wayne Lynch

A & C Black Publishers Limited, London. 2007. 175 pages, hardback, colour photographs. ISBN: 978-0-7136-8711-8, £16.99.

Penguins are extremely popular and charismatic birds, yet they are a relatively rare group. Of the nearly 9,800 species of birds in the World, only 300 species (~3%) are seabirds and there are only 17 species of penguins. The penguins are an ancient Order of birds, closely related to the Procellariiformes (tubenoses) and by 55 million years ago penguins were already flightless. Although the penguins are often regarded as Antarctic species, most inhabit temperate climates in the Southern hemisphere. Seven species are found in Antarctic waters and it is only the Emperor and Adélie that breed south of the Antarctic Circle. The Humboldt and Galápagos penguin are indeed found within the tropics and are associated with cold nutrient rich water.

Penguins of the World is not an academic textbook but is written for a wider readership. The author Wayne Lynch is one of Canada's best known nature photographers. Each page of this book has one of his beautiful colour photographs and these have been given excellent captions to explain a particular feature of penguin behaviour or ecology. The text is well written and clearly describes the biology of different penguin species with good attention to scientific detail. The author does not compromise with simplistic explanations or use too much anthropomorphic language.

This book contains six chapters covering the natural history of the penguins. Each chapter is given a popular self explanatory name: "Blueprint of a penguin", "Penguin haunts", "Sex and the single penguin", "Family life", "Breakfast, lunch and dinner" and the "The cycle ends". If I had one criticism of the content of this book it would be the fact that there is less coverage of non-Antarctic species, not unusual in similar books on this subject. There are two appendices; the first is especially useful with excellent distribution maps for each of the 17 species. The second gives a short history of the interaction between penguins and people, including recent negative impacts of tourists on penguin breeding success. Finally, there is a helpful bibliography for any penguin enthusiast which includes Cherry-Garrard's *The Worst Journey in the World* (1922) describing the winter expedition to an emperor penguin colony at Cape Crozier, along the Ross Sea (and fittingly published by Penguin Books, London) and the recent and highly topical *The Adélie Penguin – Bellweather of Climate* Change (2002) by D. G. Ainley.

This is a beautifully illustrated book and a very informative read that may inspire you to embark on an expedition to the Southern hemisphere or simply to visit the zoo to see these birds for yourself.

Dominic McCafferty

Scotland's Freshwater Fish: Ecology, Conservation and Folklore

Peter S. Maitland

Trafford Publishing, Crewe 2007. Illustrated. ISBN 14251164-9 (paperback), £15.

If you know which Scottish freshwater fish has links to the Geddes family, which killed Henry I, or fell as a shower over Merthyr Tydfil in 1916; if you can name the species that breathes through its alimentary tract or smells of "cucumbers and violets"; if you can identify the Scottish fish that can climb trees, that can be used to predict the weather or was swallowed with a glass of red wine by the Elizabethans, then you are probably either called Peter Maitland, or you have just finished reading his most recent book.

In this volume, Prof. Maitland has combined basic biology on 42 freshwater fish species found in Scotland (he includes both introduced species and species, such as Sea bass, with only occasional links to freshwater) with a unique and carefully researched insight into the place that fish have carved in the culture of Scotland. Thus poetry, literature, newspaper clippings and personal reminiscences sit alongside the more familiar scientific references and hard-core ecology. The end result is a wonderful blend of the most unusual and quirky factual facets of the life of fish and fish in our lives that can only be gathered by a lifetime of enthusiasm for all things fishy. This is carefully woven into the more staple diet of basic biology, conservation and management of this important group of our fauna. In short there is much for even the most knowledgeable in this volume.

The book is published by an "on demand" publishing house, Trafford Publishing in Canada which means firstly that you cannot buy this in shops and secondly that when you do order a copy it can take 6 weeks to arrive. The upside is that this increasingly common publishing method is highly environmentally friendly; books are only printed on order, saving the pulping of large numbers of unsold books that usually follows more traditional publishing routes.

Is there nothing to criticise? Well, it appears that this book is not available in hardback, the cover of my copy is already torn and so it is a pity that a more robust version is not available. There are also more typographic errors than is usual, which is probably reflective of the publishing route.

These minor points, however, are forgotten when you realise that for the paltry sum of £15, you have just bought the output of a lifetime of research, passion and enthusiasm. The answers to the above questions, I hear you ask? Well you will have to buy your own copy to find out. You can purchase this volume on-line at *www.trafford.com.*

Colin Adams

Sedges of the British Isles

AC Jermy, DA Simpson, MJY Foley & MS Porter

BSBI Handbook No.1, Edition 3. BSBI, London. 2007. 554 pages, softback, drawings and maps. ISBN-10 0-901158-35-6 ISBN-13 978-0-901158-35-2, £15.50.

This new edition represent a major upgrade of the original BSBI Handbook, in which the expert Clive Jermy has been joined by three other Cyperaceae specialists; the book also includes valuable feedback from many BSBI fieldworkers over the years. The end result is a much larger book, packed with information on this ecologically important group of plants.

To those familiar with the original book, the expanded format, which covers all British members of the family (not just the genus *Carex*), will be a welcome addition. In total 106 species are covered (72 *Carex* spp.) with, in addition, 50 hybrids (mainly *Carex*).

The introductory pages provide background information on plant characters, taxonomy and ecology; the latter is very welcome as it provides guidance on the preferred vegetation and soil/water conditions. The keys have been revised and are neatly sub-divided, so may not be too daunting for the beginner!

The bulk of the book is taken up by the 106 species accounts, each with extensive descriptions and supported by excellent line drawings providing all the details necessary for identification; hybrids are covered by diagnostic tables and some diagrams. Additionally up-to-date distribution maps are provided for all species.

The book is not as slim as the first volume, so it won't slip easily into your pocket, but the additional information makes it an essential reference guide for anyone wanting to study this fascinating plant family. As with all BSBI books it represents excellent value for money.

Keith Watson

The Flora of Rum (an Atlantic Island Reserve)

D.A. Pearman, C.D. Preston, G.P. Rothero and K.J. Walker

Published by the authors, 2008. 479 pages, hardback with colour plates, tables and distribution maps. ISBN 978-0-9538111-3-7, £25.00.

This is a large and comprehensive volume consisting not only of the flora, which occupies three quarters of the text, but also a longer than usual introductory section which includes the physical environment of geology, topography, climate, soils etc.; the history of Rum and the effect of the population on the vegetation; vegetation history; studies of present vegetation; former plant recording and aims and methods of the present work.

The history is particularly relevant to this study including as it does the times before the clearances when high populations of people with cattle grazing may have helped to maintain species-rich pasture; the inactivity of the private owners and the work of the Nature Conservancy after 1957. The wet climate and poor soils produced low grade vegetation and some of their aims were to restore the vegetation to a higher biological level including reafforestation with native woodland which had been destroyed early in history. These aims persisted when the Nature Conservancy Council was formed in 1974 and more visitors were encouraged.

This flora builds on the work of earlier botanists, notably Symington Grieve (1884), and Heslop Harrison (1939) and details all the species found, grouped in taxonomic sequence *viz.* stoneworts, liverworts, mosses, clubmosses and quillworts, horsetails, ferns, conifers and flowering plants, both native and introduced, totalling 1174 species including microspecies and hybrids. Information is given for each species on distribution, many illustrated by a map of tetrad (2 x 2 km.), occurrence, abundance, altitude, habitat, locality and the National
Vegetation communities involved for higher plants. It is pointed out that changes in the last century have been slight and arise from the relative continuity of intensive grazing, mainly by deer, and unintensive management. The authors hope that this flora will provide a baseline for further assessments and provide interest for the increasing number of visitors since Scottish Natural Heritage took over in 1992.

The text includes clear and informative sketch maps, 12 pages of colour plates and details of workers involved and concludes with a bibliography and index.

Ruth H. Dobson

Dragonflies

(The New Naturalist Series No. 106)

Philip Corbet and Stephen Brooks

HarperCollins Publishers, London, 2008. 454 pages, softback, colour photographs, diagrams and distribution maps. ISBN: 978-0-00-715169-1 (hardback), £25. ISBN 978-0-00-7151684 (softback), £45.

Fascinating, comprehensive, engaging and strangely empowering. This book is a true gift for anyone who wants to know more about dragonflies. More unusually, it tells us how we, the readers, can contribute to our knowledge of these fabulous insects. The book covers both the Zygoptera or damselflies and the Anisoptera, newly dubbed the 'warriorflies', collectively known as the dragonflies.

Dragonflies have become increasingly popular with amateurs and professional researchers; nice big insects with plenty of scope for study. Our knowledge of them

has expanded exponentially in the last couple of decades. This book synthesises a wealth of research into one handy and accessible tome. The exceedingly fat reference list gives us an insight into the volume of literature the authors have trawled through and assimilated on our behalf.

As the authors clearly point out, if you are keen to identify dragonflies, this is not the text for you. You are better to invest in one of the numerous excellent field guides currently available, all of which are referenced in this book. The chapter on the British species does however provide a good general introduction to our dragonfly groups. If you are interested in finding out about dragonfly life-histories, habitats, distribution, ecology, behaviour and conservation or the history of odonatology (studying dragonflies) in Britain, this is most definitely the book for you. The immature stages receive more attention than they are usually granted but not at the expense of information on adult biology. All the topics receive fascinating and comprehensive coverage and in the unlikely event that you need to explore a topic in greater detail, the best sources of information to consult are provided.

Whilst it makes for interesting general reading, the layout of the book ensures you can easily dip in and find specific information. The chapters are divided into distinct sub-headings, key facts are summarised in useful boxes and the index is detailed. The authors manage to outline the basics succinctly before moving swiftly onto the nitty-gritty and the text is littered with fascinating facts. The comprehensive glossary ensures that terminology does not pose a barrier to the enjoyment of those who are less familiar with the subject. The text is well illustrated with colour photographs by Robert Thompson. There are colour distribution maps for the British species.

At the end of relevant chapters, there is a section highlighting current knowledge gaps and providing practical tips to how we (the readers) can help fill them. Many of the examples given in the text stem from exciting research that is being conducted on mainland Europe in the USA. Discovering how the biology and behaviour of our own species in British sites compares is highlighted as worthy of investigation.

In the chapter that explores the history of odonatology in Britain, the authors talk about how key texts on dragonflies have popularised the subject. I can't help feeling this is another text that will fuel public excitement for these magnificent creatures.

I am just going to pop on to Amazon now and order my own copy as this one is destined for the society's library.

Jeanne Robinson

Guide to genera of chironomid pupal exuviae occurring in Britain and Ireland (including common genera from northern Europe) and their use in lotic and lentic fresh waters.

Ronald S. Wilson & Leslie P. Ruse

Freshwater Biological Association, Cumbria, Special Publication No. 13, 2005, 176 pp., soft back with colour photographs and line drawings. ISBN 0-0900386-73-9; ISSN 1747-1958. £20.00.

The family of flies called Chironomidae (sometimes rather loosely referred to as non-biting midges) is of great importance in the freshwater environment. Most families of midges do not feed on blood and so it is not a useful way of classifying the many and varied small flies that tend to be prolific around loch-sides, streams and rivers. Those species that annoy humans or spread diseases to us and our stock animals are in the minority. One or two annoying insects can tarnish the image of all. Committed naturalists and other out-door types learn to tolerate the biters in the pursuit of the majority. So what is it about chironomids given they can't bite that make them so important that their transient remains are the subject of a new book?

The Chironomidae form a considerable element of the food chain and so are important to fisheries. They have also become one of the principal means for assessing water quality. After the adult insects have emerged their cast skins remain floating about and can be collected relatively easily. There is also an advantage in not having to kill specimens in order to carry out a survey. The extensive use of chironomids for aquatic monitoring has resulted in a body of knowledge sufficient that such a work as this can be written. Indeed the authors are able to claim that using exuviae is efficient and can be done more easily that sampling other stages of the lifecycle. The keys are of the user-friendly 'Aidgap' style with diagrams showing the character alongside the choice(s) the user is asked to make. There is a most useful summary of the trophic groups of the various genera or species and the kinds of water body preferred. Using this one can relate the species' preferences. A species can be a resident predator of nutrient-poor fast-flowing streams and intolerant of pollution whereas another is a detritus feeder in muddy ponds with a wide range of tolerance to poor oxygen levels, and so on. Consulting this one learns that some few chironomids are terrestrial and one even lives in cow dung. The family is also well-known for containing some of the very few British insects that develop inter-tidally in salt water. Whereas the identification of the cast pupal skins of chironomids is almost entirely an activity for professional biologists or students it is quite gratifying that the means of doing so exists.

E. Geoffrey Hancock

A new key to the freshwater bryozoans of Britain, Ireland and continental Europe with notes on their ecology

Timothy S. Wood & Beth Okamura

Freshwater Biological Association, Cumbria, Scientific Publication No. 63, 2005, 113 pp., softback with black & white photographs and line drawings. ISBN 0-0900386-72-X; ISSN 0367-1887, £16.00.

The reviewer has attempted to identify freshwater bryozoans on a number of occasions using an earlier production (FBA Publication No.41, 1980). It was not always easy but was no fault of that key. Things move on and now the greater use of modern techniques makes things more certain. The main impetus to more detailed study of these interesting 'moss animals' undoubtedly was the discovery that they are the host to certain fish parasites. These are myxozoans, which are themselves enigmatic animals, whose life cycle in this context had been a mystery. All of a sudden bryozoans have been catapulted into the category of being 'economically important'. Questions need to be answered relating to control and risk. Peering at them through a microscope is no longer an esoteric occupation for the merely curious. Some of the research work on them as vectors of parasites is being carried out in Scotland because of the importance of salmon and trout farms as sources of wealth and employment for local communities. In addition to the issues of identification, so crucial to studying the biology of anything, a considerable part of this booklet is concerned with biology and ecology. It makes interesting reading. The study of freshwater Bryozoa is undergoing some change and more new discoveries and changes will take place. Between the two FBA keys seven species have been added to the British list and two removed. This is an area where scientific investigations are affecting radically the way various creatures' biology are understood at a quite basic level.

E. Geoffrey Hancock

Garden Natural History (The New Naturalist Series No. 102)

Stefan Buczacki

HarperCollins, London. 2007. Illustrated. ISBN 9780007139934 (hardback), £45. ISBN 9780007139941 (paperback), £25.

On reading this book I was reminded of an item I submitted in the Newsletter of the GNHS some time ago. It started "Am I at heart a gardener or natural historian ..." and went on to describe the difficulties I found in reconciling my two interests. Professor Stefan Buczacki must have heard my heartfelt plea!

This extensively researched book makes highly depressing reading. Starting with examples of 'gardening' from the Neolithic Age (and I'm sorry to report that Skara Brae is one of the few Scottish references to be found in this entire volume) the author has worked his way through the history of Britain, searching in vain to find an area where gardening and natural history coalesce. Charles Darwin is virtually the only person Buczacki could find who recognised that the garden can and should inspire all naturalists. He considers that even Gilbert White falls short in this respect!

The work appears at a time when 'global warming' is the buzz phrase in all branches of the media and not just in gardening and natural history programmes. Most of us shake our heads at the irresponsible and continuing development of brownfield garden sites; not to mention the wanton destruction of a forty-year old allotment in Hackney, the victim of a footpath merely for the duration of the Olympic games.

Interviews with the perpetrators of similar heinous crimes that have been seen recently on television reinforce Professor Buczacki's warning that few, if any, of our government or local council representatives have sympathy with anything other than votes and finance.

Even more depressing is Buczacki's conclusion that even today the majority of natural historians are not gardeners and likewise most gardeners are not directly interested in the far-reaching effects that the minutiae of wildlife have on our gardens. How, he asks, are we to encourage a marriage of these two in order to illustrate and teach the extreme importance of the role of the garden as a habitat within which vertebrates and invertebrates as well as native and alien plants have been introduced and have adapted?

I have to disagree with the author about this. Admittedly the average householder who owns a garden probably falls into the category of merely feeding the foxes thereby encouraging rats; but in my experience most keen and able gardeners are very actively involved with and very knowledgeable about, the natural history of their patch.

This excellent addition to the New Naturalist Series is a must-read for all who care about "... the diversity of organisms and ecological processes that constitute the garden ...", and should surely galvanise every programme editor in the field, particularly those working in television, which commands the widest audience. As Professor Buczacki says, commissioning editors, whether in the documentary or entertainment field, must be enabled to remove their blinkers and work together sympathetically and in tandem.

If there is a weakness in this work it is in the illustrations. In this digital age we expect a better quality than many of those presented, few of which make a valid or interesting point.

Junella Mackay

The World of Lakes: Lakes of the World

Mary J Burgis and Pat Morris

Freshwater Biological Association in association with MPM Publishing, Ascot. FBA Special Publication no 15. 2007. 281 pages, diagrams and colour photographs, softback. ISBN-10: 0900386762, ISBN-13: 9780900386763, £25. This is a revised and updated version of the original 1987 edition published by Cambridge University Press as The Natural History of Lakes.

The early chapters of this excellent book deal with the following topics: the various origins of lakes, their structure and underwater topography, the physical and chemical properties of lake waters and how these affect productivity and the variety of communities within any given lake. A chapter on seasonal variations contrasts temperate and tropical examples. This is followed by a number of chapters, each devoted to lakes where conditions are inimical to life in some way. The adaptations of flora and fauna to polar and mountain regions, saline and soda lakes and extremely deep or shallow lakes are described. The final chapters deal with man-made lakes and reservoirs and the use and abuse of lake environments by man. The book ends with a brief comment on conservation, a theme implicit throughout the work.

This is a clearly written and accessible account of a complex subject. It is illustrated by excellent photographs,clear diagrams and maps and attractive drawings. The wealth of examples given provide engrossing stories and thought-provoking information. Scottish readers may note with some dismay the absence any reference to Loch Lomond from the text and index. (It does appear in one diagram!) Perhaps this can be forgiven in a world overview. Loch Leven and Loch Ness however are both mentioned at some length. This book will be welcomed by students, amateur and professional limnologists, and by anyone who is concerned about the many varied and fragile communities that depend for their lives on the lakes of this world.

Avril Walkinshaw

Scotland's Beginnings: Scotland through time

Michael A. Taylor & Andrew Kitchener

National Museums Scotland, 2007. 88 pages, softback, generous coloured image coverage. ISBN 1-901663-26-4 (10 digit) ISBN 978-1-901663-26-6 (13 digit), £8.99

This is a well produced and readable little book. It is designed to captivate not only the geologist but also the zoologist, botanist and all those interested in the story of the formation of Scotland.

Drs. Taylor and Kitchener were leading curators of the National Museum of Scotland's exhibition entitled "Beginnings" which inspired this book.

The story starts some 650 million years ago when Scotland was located near the South Pole and then, owing to tectonic plate movements, made its way northwards to near the North Pole, before reaching its present location. The geology is dealt with in detail but in a way that is easily understood. The book tracks the changes in the landscape and wildlife caused by alterations in the environment which are recorded in the rocks. Mountains being thrown up, deserts developing, flooding taking place, high plateaux being formed and the subsequent effects of ice action – all are explained with excellent photographs and diagrams.

From the last Ice Age the picture widens to introduce the plants and animals that have existed since then in Scotland. There is coverage of extinct forms, based on fossil evidence and pollen analysis. Not all life was wiped out as a result of the Ice Ages and there is an interesting chapter about relict species, ice age survivors. There is also excellent coverage of modern Scotland's natural heritage, dealt with by habitat.

The final section deals with conservation and has an interesting list of websites and real places to visit. In conclusion, for the price, an excellent buy.

Ian C. McCallum

The World from Beginnings to 4000 BCE

Ian Tattersall

New Oxford World History, Oxford University Press, Oxford 2008, 143 pp hardback with b & w illustrations and photographs.
ISBN 978 0 19 516712 2 hardback £10.99 and 978 0 19 533315 2 paperback.

Despite the rather misleading title, this is a book on human evolution. Yet another. There are so many books in this field that the first question must be, what does this one offer that the others don't. One answer is brevity – at only about a hundred pages it offers a snappy introduction, that is also authoritative and reasonably up to date. The author is a prolific research scientist on the human fossil record, and curator of Anthropology at the American Museum of Natural History. Perhaps we should also add that it is cheap! The book is part of an OUP series on World History, and is clearly aimed at the general reader who may be new to biology. So there are general introductions to the process of evolution, how fossils are formed, and how animals are classified. It gives a good summary of the key stages in human evolution, dealing with information from DNA and other molecular techniques as well as the classic fossil and archaeological evidence. The book is clearly written and does provide a handy, and accessible introduction to what can be a rather complicated story.

David Houston

Proceedings 2008

The Chair, place, lecturer and title of lecture are given. GKB - Graham Kerr Building. All meetings were well attended.

8th January
John Knowler, GKB, "Conservation Science - Bales Mountains, Ethiopia". Flavie Viale.

12th February
Roger Downie, GKB, David Palmer giving a talk on Wildlife Photography.

26th February
John Knowler, GKB, 78th AGM followed by Presidential Address by John Knowler, "The Flora, Fauna and Geology of Spitzbergen".

11th March
Roger Downie, GKB, Members Photographic Night. Preceeded by tutorial by Jeanne Robinson on Bumblebees.

8th April
Roger Downie , GKB, "Recording Biodiversity in Glasgow" – Richard Weddle and Richard Sutcliffe. Preceeded by Edna Stewart talking about Wildflower identification.

13th May
Roger Downie , GKB, "The history of marine natural history in the Clyde", Prof. Geoff Moore. Bernie Zonfrillo gave a tutorial on Gannets before this.

Excursions 25 excursions took place throughout the year. Including Summer Social to Inchmurren on June 12th.

16th September GKB, Exhibition meeting, cheese & wine.

8th October
Roger Downie, GKB, BLB Lecture. Prof. David MacDonald "A brush with foxes and some other carnivorous tales". BLB Prize: Jill Williams.

14th October
Roger Downie, Hunterian Museum Annexe, "Geology for Biologists". John Faithfull.

14th November
Roger Downie, GKB, "Bat Conservation in man-made environments". Kirsty Park. Preceeded by David Palmar tutorial on Wildlife Photography.

27th November
Roger Downie, GKB, Jointly with Glasgow Zoological Society. "Year of the Frog" lecturer Jules Howard.

11th December
Christmas Dinner held in Museum, GKB, Ross Macleod, Conservation of Curassows in Peru/Bolivia.

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David Palmar, MA, Dip Ed, Dip Comp Ed	(Photography)
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The Glasgow Naturalist

Advice to Contributors

1. The Glasgow Naturalist publishes articles, short notes and book reviews. All articles are peer reviewed by a minimum of two referees. The subject matter of articles and short notes should concern the natural history of Scotland in all its aspects, including historical treatments of natural historians. Details of the journal can be found at: www.gnhs.org.uk/publications.html

2. Full papers should not normally exceed 20 printed pages. They should be headed by the title and author, postal and email address. Any references cited should be listed in alphabetical order under the heading References. All papers must contain a short abstract summarising the work. The text should normally be divided into sections with sub-headings such as Introduction, Methods, Results, Discussion and Acknowledgements.

3. Short notes should not normally exceed one page of A4 single-spaced. They should be headed by the title and author's name, postal and email address. Any references cited should be listed in alphabetical order under the heading References. There should be no other sub-headings. Any acknowledgements should be given as a sentence before the references. Short notes may cover, for example, new locations for a species, rediscoveries of old records, ringed birds recovered, occurrences known to be rare or unusual, interesting localities not usually visited by naturalists, and preliminary observations designed to stimulate more general interest.

4. Referenees should be given in full according to the following style:

Pennie, I.D. (1951). Distribution of Capercaillie in Scotland. *Scottish Naturalist* 63, 4-17.

Wheeler, A. (1975). *Fishes of the World*. Ferndale Editions, London.

Grist, N.R. & Bell, E.J (1996). Enteroviruses. Pp. 381-90 In: Weatherall, D.J. (editor). *Oxford Textbook of Medicine*. Oxford University Press, Oxford.

5. An organism's genus and species should be given in italics when first mentioned. Thereafter the common name is only required. Please use lower case initial letters for all eommon names e.g. wood avens, blackbird; unless the common name includes a normally capitalised proper name e.g. Kemp's ridley turtle. The nomenclature of vascular plants should follow Stace, C.A. (1997). *The new Flora of the British Isles*, (Second Edition). Cambridge University Press, Cambridge. Normal rules of zoological nomenclature apply. When stating distribution, it may be appropriate to give information by vice-county.

6. All papers, including electronic versions, must be prepared on A4, double spaced throughout, with margins of 25mm, with 12 point Times New Roman font. Tables and the legends to figures should be typed separately and attached to the end of the manuscript. The Editor can make arrangements to have hand-written manuscripts typed if necessary.

7. Tables are numbered in Arabic numerals e.g. Table 1. These should be double-spaced on separate sheets with a title and short explanatory paragraph underneath.

8. Line drawings and photographs are numbered in sequence in Arabic numerals e.g. Fig. 1. If an illustration has more than one part, each should be identified as 9 (a), (b) etc. They should be supplied as a high resolution digital image or camera-ready for uniform reduction of one-half on A4 size paper. Line drawings should be drawn and fully labelled in Indian ink, dry-print lettering or laser printed. A metric scale must be inserted in photo-micrographs etc. Legends for illustrations should be typed on a separate sheet. Photographs are normally printed in black and white, however the Editor is able to accept a small number of high quality colour photographs for each issue.

9. Articles should be submitted preferably by email either as a single word processed document or pdf to the Editor: Dr Dominic McCafferty d.mccafferty@educ.gla.ac.uk or by post (2 copies) to Department of Adult and Continuing Education, University of Glasgow, St Andrew's Building, 11 Eldon Street, Glasgow G3 6NH, Scotland. Photographs and illustrations should be high resolution with a minimum of 300 dpi in tif or jpeg format. Please eontact the Editor if you require assistance with photographs as in some cases suitable photographs can be obtained.

10. When the article is accepted for publication, the author should return the corrected manuscript to the Editor as soon as possible. Final proofs should be returned to the Editor by return of post. Alterations at this stage should be kept to the correction of typesetting errors. More extensive alterations may be charged to the author.

11. A copy of the published article will be sent to the first author as a pdf file. Ten reprints will be supplied free of charge for full papers only. Additional reprints required will be charged at extra cost.

12. All submissions are liable to assessment by the Editor for ethical considerations, and publication may be refused on the recommendation of the Editorial Committee.

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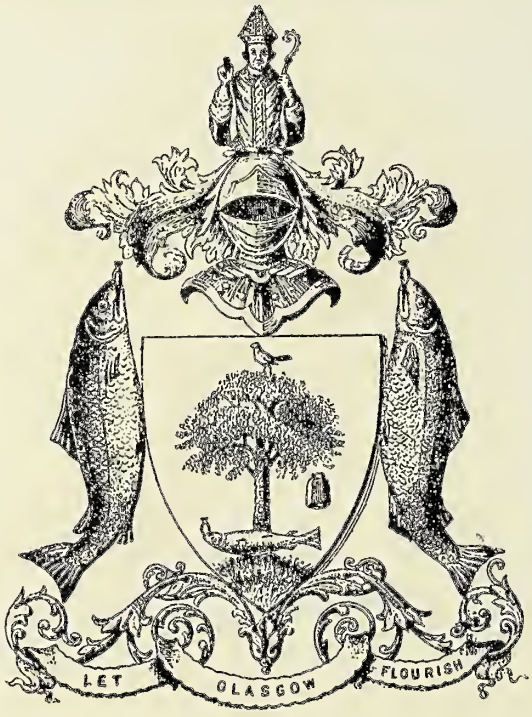

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